PRODUCTION AND MANUFACTURING PROCESS

Raw material requirement:

<table>
<thead>
<tr>
<th>SR. NO</th>
<th>RAW MATERIAL</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Corn / Grains</td>
<td>150 TPD Assam, Bihar, West Bengal, Uttar Pradesh.</td>
</tr>
<tr>
<td>2.</td>
<td>Malt</td>
<td>15 TPD Assam, Bihar, West Bengal, Uttar Pradesh.</td>
</tr>
<tr>
<td>3.</td>
<td>Alpha Amylase</td>
<td>30 Kg Directly from the Chemical Companies</td>
</tr>
<tr>
<td>4.</td>
<td>Amyloglucosidase</td>
<td>30 Kg Directly from the Chemical Companies</td>
</tr>
<tr>
<td>5.</td>
<td>Sulphuric Acid</td>
<td>50 Kg Authorized Dealers</td>
</tr>
<tr>
<td>6.</td>
<td>Urea</td>
<td>60 Kg Local Market</td>
</tr>
<tr>
<td>7.</td>
<td>Nutrients Ammonia</td>
<td>150 Kgs Local Market</td>
</tr>
<tr>
<td>8.</td>
<td>Antifoam</td>
<td>0.6 kg per KL 36 kgs Local Market</td>
</tr>
<tr>
<td>9.</td>
<td>Yeast</td>
<td>As per requirement Authorized Dealers</td>
</tr>
<tr>
<td>10.</td>
<td>Biocides</td>
<td>30 kg Local Market</td>
</tr>
</tbody>
</table>

Manufacturing Process: -
ENA production involves the extraction and Saccharification of starches and their conversion into alcohol by fermentation process.
To achieve the best results it has to be channeled through the following process:

a) Grain Milling.
b) Cooking
c) Fermentation.
d) Distillation.

1. Grain Milling:
The process of converting grains to alcohol is by the single continuous fermentation process. The incoming cereals are usually inspected upon receipt. The distiller will check the grain for bushel weight, moisture content, mold infestation and general appearance. If the cereal complies with the quality control standards, it will be unloaded into silos in preparation for milling. Milling breaks up the cereal grains to as small a particle size as possible in order to facilitate subsequent penetration of water in the cooking process.

2. Cooking
Cooking is the entire process beginning with mixing the grain meal with water through to delivery of a mash ready for fermentation.
Continuous cooking is required to produce ENA. In this process, starch mash and a pre-liquefying enzyme called alpha-amylase are sent to a mash mix tank where they are agitated to keep the starch in suspension. Alpha-amylase introduction is necessary to prevent the gelatinization of the starch mash in the mix tank which makes pumping difficult.
The mash is then continuously fed to a jet cooker where it is mixed with steam. The mash and steam is held at high temperature and pressure in the cooker for some time.
From cooker, the mash is sent to a flash tank to cool and separate from the injected steam. Steam from the flash tank can be recovered and used in drying fermentation residues, which can be sold as livestock feed or recycled in the process.
Prior to cooling, sulphuric acid may be added to reduce pH to 3.7-4.5
From the mash coolers, the liquefied mash is pumped to the Saccharification tank. Glucoamylase enzyme is then added to the mash prior to the start of Saccharification process. Glucoamylase will convert the dextrin (liquefied mash) to glucose. In the tank, the mash is either agitated or circulated to ensure proper mixing of the enzyme and mash.

Cooking is employed to simply liquefy the starch so it can be pumped. The source of alcohol from cereal grains is the glucose polymer known as starch. The purpose of cooking and Saccharification is to achieve hydrolysis of starch into fermentable sugars. In order for the α-amylase to bring about hydrolysis of the starch to dextrin’s, the granular structure of the starch must first be broken down in the process known as gelatinization. When the slurry of meal and water are cooked, the starch granules start to absorb water and swell. They gradually lose their crystalline structure until they become large, gel-filled sacs that tend to fill all of the available space and break with agitation and abrasion. The peak of gelatinization is also the point of maximum viscosity of a mash. This mash contains 65% convertible sugar. The conversion of starch to glucose is shown in Equation 3.

\[(C_6H_{11}O_5)_n + nH_2O \xrightarrow{\text{enzymes}} nC_6H_{12}O_6\]

3. Continuous Fermentation:
In fermentation, yeast consumes glucose and releases ethanol, carbon dioxide, and heat.

\[C_6H_{12}O_6 \xrightarrow{\text{yeast}} 2C_2H_5OH + 2CO_2\]

Typical fermentation processes convert about 90% of the fermentable sugars to ethanol. Yeasts consume about 5% of the fermentable sugars to produce new cells and minor products such as glycerol’s, acetic acid, lactic acid, and fusel oils. The fermentation process employs a special yeast culture, which can withstand variations in the quality, temperature and other shock loads.

Fermentation plant consists of five to six numbers Fermentation tanks connected in series with all the accessories like plate heat exchangers for cooling, sparges, broth mixers and air blowers etc. The yeast is immobilized using special media and it remains in the fermentation plant throughout and hence it gives tremendous advantages in maintaining the yeast population and in combating the bacterial infection. The technology is called continuous mixed bed fermentation (CMB). Saccharified slurry from Saccharification section is pumped into Fermentation tank and is diluted to appropriate sugar concentration by adding water. It is, then inoculated with required quantity of suitable yeast. The assimilable nitrogen is added in the medium in the form of urea and DAP.

Temperature in the Fermentation tank is maintained with the help of plate heat exchanger. The fermented mash is recirculated continuously through PHE. Recirculation also helps in proper mixing of fermented mash. The rate of fermentation reaction gradually increases and after 50 to 55 hours, fermentation completes. After completion of reaction, the fermented mash is delivered to mash holding tank. After completion of reaction the fermented wash is delivered to yeast separator. After the separation, yeast is sent to activation vessel.

The CO₂, which is liberated, is scrubbed in water, with the help of CO₂ Scrubber. This CO₂ contains ethanol, which is recovered by collecting CO₂ Scrubber water into Sludge Trough. The diluted sludge is pumped into Sludge Settling clarifier. The traces of ethanol present in diluted sludge are separated at the supernatant, which is collected into BWT through overflow, and washed sludge from bottom is drained off. The fermented mash collected in the Clarified Wash Tank is then pumped to Mash or Primary column for distillation.

4. Distillation
Vacuum distillation method is adopted for obtaining Ethanol. In vacuum distillation, ethanol is separated and concentrated using principal of fractional distillation. This is based on difference in boiling points of volatile compounds in mixture. There are six columns in the system Primary column:

1. Mash column,
2. Rectifier column,
3. Hydro extractive distillation column,
4. Refining column,
5. Aldehydes Column and
6. Defuse Column.
Primary Mesh Column:
The Primary or Mash column is operated under vacuum and it is heated using the vapors from the Rectifier column, which is operated under a slightly higher pressure. The vacuum operation of the Primary column will help in reducing the overall energy requirement and also improve the product quality.
The fermented mash is preheated using a beer heater at the top of the Primary column and followed by a plate heat exchanger and finally delivered to the top of Primary column. The pre heating of mash in two stages recovers energy and saves steam required for the distillation. The mash runs down the Primary column trays from tray to tray, while vapour goes up in the column contacting the mash at each tray.
As a result of this contact and boiling alcohol and other impurities along with some water are stripped in the form of vapours and remaining mash in the form of effluent is disposed off from the bottom of the primary column. When the vapours of alcohol and other volatile compounds reach the top, they are separated out from the top of primary column and taken to pre-rectifier column where they are condensed in beer heater and other primary condensers. The heat is supplied by the Final Rectifier vapours from the Reboilers provided at the bottom of the Primary column. Two Reboilers are provided at the bottom of the Primary column to facilitate the heat transfer from Rectifier column vapour to primary column.
The vapours from Pre Rectifier column top condensed in the above condensers are collected and then sent as reflux liquid. The RS draw is from this column and is fed to RS cooler and sent to RS Storage Section via Safe & Tester Assembly if RS is required as final product.
The RS is fed to the Hydro extractive distillation column for purification.

Hydro Extractive Distillation Column:
The ethanol streams from other columns are also diluted with soft water and are fed to Hydro extractive distillation column via a feed pre heater (plate heat exchanger). A Re-boiler is installed at the bottom of the Hydro extractive distillation column. Impurities such as Aldehydes and Fusel oil are removed from the top of the Hydro extractive distillation column and are fed to Fusel oil concentration column, while dilute ethanol along with fewer impurities, are taken from the bottom of the Hydro extractive distillation column and fed to Rectifier column middle. Steam is fed to Hydro extractive distillation column through Re-boiler. A Re-boiler is installed at the bottom of the Rectifier column, which heats the process liquid i.e. alcohol and water received from the Hydro extractive distillation column, indirectly with the help of steam.

Rectifier Column
In the Rectifier column, the ethanol is concentrated to 96 % by refluxing the Rectifier reflux liquid. Extra neutral ethanol (ENA) is tapped from the top of Rectifier column, which is directly sent to Refining column for removal of other low boiling impurities. While the bottom product of the Rectifier column called spent lees is drained off.
The higher alcohols also called light and heavy fusel oils are removed from the middle portion of the Rectifier column. Light and Heavy fusel oil from Rectifier column and top cut from Hydro extractive distillation column plus ester cut from Hydro extractive distillation column is fed to Fusel oil concentration column. The steam is delivered from the bottom of the Defusel Column to allow the desired separation. Fusel oil consisting of higher alcohols viz. amyl alcohol, Iso amyl alcohol, n-propanol etc. are concentrated near middle portion of Fusel oil concentration column and can be removed and separated in the Fusel Oil Decanter in sufficient higher concentration. While the bottom product called spent lees is drained off. The top product from the Defusel Column is cooled in the cooler and sent to storage as Technical Alcohol.

Refining Column
The Refining column is fed with the ENA from the Rectifier column, which is boiled off in the Refining column to remove the low boiling impurities like methanol and mercaptants. Extra Neutral Alcohol (ENA) is tapped from the bottom of the Refining column, which is cooled upto 30 °C, by passing through ENA cooler. ENA is then properly stored.
The impure ethanol, which contains many impurities, is drawn from the top of the Refining column and cooled in the cooler and sent to storage as Technical Alcohol. Alternatively diluting with soft water in Aldehydes Column as and when required can further purify some of these Technical Alcohol streams.
## FACILITIES FOR STORAGE OF GOODS OR MATERIALS

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>NAME OF THE GOODS OR RAW MATERIAL</th>
<th>TYPE OF STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Grains</td>
<td>Metal silo</td>
</tr>
<tr>
<td>2.</td>
<td>Sulphuric Acid</td>
<td>MS Tank with lining</td>
</tr>
<tr>
<td>3.</td>
<td>Rectified Spirit</td>
<td>MS Tanks</td>
</tr>
<tr>
<td>4.</td>
<td>Extra Neutral Alcohol</td>
<td>SS Tanks</td>
</tr>
</tbody>
</table>
FACILITIES FOR TREATMENT OR DISPOSAL OF SOLID WASTE OR LIQUID EFFLUENTS

Liquid effluents:

Domestic Waste Water:
The domestic wastewater is treated through septic tank and disposed through soak pit/well.

Industrial Effluent:
• Grain Slops (Spent wash) is taken through centrifuge decanters for separation of suspended solids separated as wet cake & DDGS after Drying by passing through steam tube dryer and which goes as cattle feed.
• Thin slops from the Decanter centrifuge are partly recycled back to process and partly taken to thin slops evaporation plant for concentration of remaining solids to form syrup. This syrup is also mixed into the wet cake coming out of centrifuge and forms part of Cattle feed.
• The process condensate is cooled and collected into a neutralized tank with sufficient residence time. After neutralization, this process condensate will be recycled into process and is used for green belt development within the complex.

Solid waste:

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>TYPE OF WASTE</th>
<th>SOURCE</th>
<th>WASTE MANAGEMENT DETAILS (FINAL DISPOSAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Grains residue (DDGS/DWGS)</td>
<td>Process</td>
<td>Approx 120 MT as DWGS or approx 42 MT as DDGS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use as cattle feed</td>
</tr>
<tr>
<td>2.</td>
<td>Fly ash</td>
<td>Boiler</td>
<td>Approx 10 MT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trapped and sold to nearby cement plant &amp;brick manufacturers</td>
</tr>
</tbody>
</table>
LAND AGREEMENT DOCUMENT

LEASE DEED

THIS DEED OF LEASE IS MADE ON THIS 21ST DAY OF JANUARY 2014 AT GUWAHATI

BETWEEN

(1) Smti. Sweta Jalan, wife of Sri Rajesh Kumar Jalan, (2) Sri Rajesh Kumar Jalan, S/o.- Late Lakshmi Narayan Jalan, (3) Sri Suresh Kumar Jalan, S/o.- Late Lakshmi Narayan Jalan, (4) Smti. Sangeeta Jalan, W/o.- Sri Suresh Kumar Jalan, (5) Sri Sanjay Kumar Jalan, S/o.- Late Lakshmi Narayan Jalan and (6) Snowfall Commercial Pvt. Ltd. having its Registered Office at - 9 Mango Lane, Kolkata (West Bengal) and Administrative Office at – H. No. 17, Chitrakulha Lane, Usha Nagar, Super Market, Dispur, Guwahati, Assam duly represented by its Director Sri Rajesh Kumar Jalan son of Late Lakshmi, residents of House No. 17, Chitrakulha Lane, Usha Nagar, Super Market, P.O. & P. S.- Dispur, Guwahati, Kamrup, Assam, hereinafter called the “LESSOR” (which expression shall unless excluded by or repugnant to the context shall mean and include their heirs, executors, administrators, successors and assigns) of the FIRST PART.

AND

AND

Manglam Distillery & Bottling Industries

Director.
M/S. Manglam Distillers and Bottling Industries, a Partnership Firm having its Branch Office at Vill.- Pacharia, Mouza- Pub Bongsr, Dist.- Kamrup, Assam and Head Office at A. T. Road, Hijuguri, P.O. & P.S.- Tinsukia, Assam, represented by its Managing Partner Sri Rajesh Kumar Jalan hereinafter called the “LESSEE” (which expression shall unless excluded by or repugnant to the context shall mean and include the Lessee, its heirs, executors, administrators, successors and assigns) of the SECOND PART.

WHEREAS, the Lessor is the absolute owner and possessor of a plot of land, measuring more or less 23 Bighas, 3 Katha, 15 Lechas, covered by Dag No. 160, 161, 154, 151, 155, 150, 156 and 157, comprised in K.P. No. 306, 248, 94, 75, 237, 317, 211 and 168 respectively, situated at Revenue Village- Pacharia Dalarpather, Mouza- Pub Bongsr in the District of Kamrup, Assam (Fully described in the schedule below).

AND WHEREAS, the Lessee being a Partnership Firm and being interested in setting up a factory for manufacturing of Sprit and allied products in the state of Assam, required a suitable land for the proposed factory, approached the Lessor for leasing out the plots of land, fully described in the schedule herein below to it for the purpose of setting up the above said factory.

AND WHEREAS, the Lessor finding the proposal of the Lessee suitable and in consideration of the rent proposed to be paid by the Lessee fair, according to the prevailing market rate, has agreed to lease out the land more fully described in the schedule below under the terms and conditions as set forth herein below.

WHEREAS IT IS MUTUALLY AGREED AS FOLLOWS:

1. That the Lessor agrees to lease out the said land and Lessee agrees to take on lease all that piece and parcel of the said land situated at Revenue Village- Pacharia Dalarpather, Mouza- Pub Bongsr in the District of Kamrup, Assam, more fully described in the Schedule herein under, for a period of 40 (Forty) years commencing on and from the date of execution of the Lease Deed, and accordingly the Lessor will hand over the possession of the said land to the Lessee free from all encumbrances.

2. That the rent of entire demised land more fully described in the schedule herein below is fixed at Rs. 32,00,000/- (Thirty Two Lac) only for the entire lease period of 40 years at the rate of Rs. 80,000/- (Eighty Thousand) only per annum.

3. That the Lessor shall issue valid receipt for the rents received by the Lessor from the Lessee.

That the Lessee shall occupy and use the said land absolutely at its sweet discretion in any commercial venture, industry, agriculture or non-agricultural purposes such as cultivation, horticulture, forestry, business, trade and/or for other purposes as the Lessee may deem fit and proper and the Lessor shall have no right whatsoever to interface with regards to the use of the demised land.

Manglam Distillers & Bottling Industries

Snowfall Commercial Private Limited

Partner

Director.
5. That the lessee shall be solely liable for the payment of electricity bills in connection with the power consumed in the land and the proposed factory during the entire period of the lease as per the bills raised by the Energy and power Department, Government of Sikkim.

6. That the Lessee shall bear all the expenses towards water charges, sanitation charges as per the bills raised by the concerned authority for the lease period.

7. That the Lessee shall be at liberty to insure the premises and properties as demised at its own cost, if so desires.

8. That the Lessee shall be entitled to transfer, assign, lien or mortgage its lease right onto the said land to any financial institution, scheduled bank, or any individual without written consent from the Lessor.

9. That the Lessee can alter/modify the demised land within its four corners as per its requirements and it shall at all times be entitled to apply for and obtain own electricity, water, telephone, telex and other utilities and services at the demised land and it shall also be at liberty to construct or build houses, tenements, sheds, passage, drains, electrification, boundary wall, place of worship, whatsoever thereon at its own cost without any written consent from the Lessor or any other person claiming under her directly or indirectly and to fix and to set up plant and machinery, tools, equipment, fixtures, fittings, laying of wire, conduits and pipes underneath or over the said land as lessee shall think fit and proper.

10. The Lessee shall have right to obtain loan from scheduled bank, financial institutions or any individual by mortgaging the lease right of the land as security against such loans without any written consent from the Lessor.

11. That it by fire, tempest, flood or landslide or riot or violence or other irresistible force or natural calamities, the said land or part thereof is destroyed / damaged or rendered unfit the lessee can restore or build, construct the whole and or part thereof as the case may be at its own cost and the Lessor shall have no right to raise any kind of objection

12. All taxes and other outgoing in respect of the said land up to the date of completion of the registration of the Deed of Lease shall be paid by the lessor.

13. That the lease rent shall be exclusive of the future taxes, assessments, dues, levies, duties payable in respect to the said land and the plant, the building or buildings constructed thereon, to the government or the municipal corporation or any other local authority or public body and which taxes etc., will be payable by the lessee as and when they become due and payable.

14. That the cost by way of stamp duty and registration charges in respect of the Deed of Lease shall be borne by the Lessee.
15. That the lessee shall keep the premises in such condition so as not to endanger human life and property.

16. That the lessee shall keep the premises in good and healthy condition and shall maintain the neatness and cleanliness so as not to cause nuisance or danger or harm to any person or persons living in the vicinity of the demised premises.

17. That in the event of earlier determination of this lease on the part of the Lessor, the Lessor shall make good to the Lessee all the rent paid by the Lessee and shall also make arrangement for an alternate land and bear all the cost of setting new structures or factory or shifting of the existing structure/factory to the new land so arranged. The Lessor shall also be liable to compensate the Lessee for the losses suffered by the Lessee.

18. That during the period of lease the Lessor shall not interfere with the Lessee in connection with the demised land and the running of the commercial venture or the factory and its business and shall extend all co-operation as and when the same is sought by the lessee.

19. That by virtue of this Lease Deed it shall be construed that the Lessee shall not require any no objection certificate from the Lessor for any purpose and it shall be construed that the Lessor has no objection to all the lawful acts the Lessee may do or have to do in the demised land. However as and when demanded the Lessor shall give a No Objection Certificate to the Lessee for any lawful purposes such as obtaining electricity connection, water connection, sanitation work, all the civil works to be carried out in the land, to procure licenses from the concerned authorities etc.

20. That the lessee, paying the rent hereby the rent reserved and observing and performing the conditions of the covenants shall quietly and peacefully hold, possess, run and enjoy the above said demised land during the said term without any interference, disturbance and interruption by the lessor or any person claiming under him.

**SCHEDULE OF THE LAND**

All that piece and parcel of land measuring more or less 23 Bighas, 3 Katha, 15 Lechers, covered by Dag No. 160, 161, 154, 151, 155, 150, 156 and 157, comprised in K.P. No. 306, 248, 94, 75, 237, 317, 211 and 168 respectively, situated at Revenue Village- Paehria Dalarpur, Mouza- Pab Bengor in the District of Kamrup, Assam and butted and bounded as under.

- East: Land of Dag No. 166, 158, 159, 163 and 164.
- West: Land of Dag No. 149, 152, 153 and 656.
- North: Land of Dag No. 111.

Mangalam Distillers & Bottling Industries Limited

**(Signature of Partner)**
IN WITNESS WHEREOF the parties hereto have set and subscribed their respective hands the day, month and the year herein above mentioned.

1. Suvra Jalan
2. Somajeet Kumar Jalan
3. Gauri Kumar Jalan
4. Sangeeta Jalan
5. Jyoti Kumar Jalan

Snowfall Commercial Private Limited

LESSORS

Manglam Distillers & Bottling Industries

LESSEE

Saligram Chead
Kasupur Metro
Kagol Nokubi

WITNESSES:

1. Padman Basu
2. Late Mokalal Basu
3. Laxmi Nager

Advocate

Sangam Chetia
NOTARY SOOT OF ASSAM
Kamrup (Metro), Guwahati
Room No. 14