

F. No. 4/1/2018-(BP&E)(Part)  
Government of India  
Ministry of Consumer Affairs, Food, and Public Distribution  
(Department of Food and Public Distribution)  
Directorate of Sugar & Vegetable Oils

Krishi Bhawan, New Delhi  
Dated: 11.11.2022

**OFFICE MEMORANDUM**

**Subject:-** Mechanism to assess production of ethanol from B-Hy, C-Hy molasses, sugarcane juice, sugar & sugar syrup, food-grains such as maize, broken rice, surplus rice sourced from FCI etc. and mechanism to identify the quantity of ethanol produced from these routes separately: Guidelines regarding.

The undersigned is directed to refer to the new Committee constituted under Chairmanship of Director, NSI(Kanpur) to study the issues concerning to production of ethanol from B-Hy, C-Hy molasses, sugarcane juice, sugar & sugar syrup, food- grains such as maize, broken rice, surplus rice sourced from FCI etc. and mechanism to identify the quantity of ethanol produced from each of these feed stocks.

2. The Committee constituted under the Chairmanship of Director (NSI); Kanpur comprising of other members viz. representatives from Excise and Sugar/Sugarcane Departments of Uttar Pradesh and Maharashtra, Ministry of Petroleum & Natural Gas, OMCs, ISMA ,NFCSF & AIDA has suggested a detailed mechanism for production of ethanol from B-Hy, C-Hy molasses, sugarcane juice, sugar & sugar syrup, food- grains such as maize, broken rice, FCI rice etc. and mechanism to identify the quantity of ethanol produced from each of these feed stocks.

3. Based on the recommendation of the Committee, this Department has formulated a new set of guidelines in supersession of earlier guidelines issued vide OM No. 4/1/2018-(BP&E)(Part-I) dated 2<sup>nd</sup> December 2021, particularly, with reference to parameters to be considered for determining quality of B- Hy molasses and evolving criterion for assessing ethanol production mechanism from grains such as maize, damaged food grains like broken rice, surplus rice sourced from FCI etc which is enclosed herewith for strict compliance by sugar mills and concerned distilleries.

Enclosure: as above



(Sangeet)  
Director (S&VO)  
#011-23383760

To,

1. Principal Secretaries in charge of Sugar of concerned States
2. Principal Secretaries of Excise Departments of concerned States
3. Cane/Excise Commissioners of concerned States

4. Ministry of Petroleum & Natural Gas
5. All sugar mills with attached distilleries/standalone ethanol distilleries
6. ISMA with a request to circulate the guidelines among its member sugar mills/distilleries.
7. NFCSF with a request to circulate the guidelines among its member sugar mills/distilleries.
8. AIDA with a request to circulate the guidelines among its member distilleries.

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**Guidelines for sugar mills /distilleries regarding the production of ethanol by from B-Hy, C-Hy molasses, sugarcane juice, sugar & sugar syrup, food-grains such as maize, broken rice, surplus rice sourced from FCI etc. and mechanism to identify the quantity of ethanol produced from these routes (Reference DFPD OM No. 4/1/2018-(BP&E)(Part-I) dated 2nd December 2021)**

These guidelines are issued in supersession to earlier guidelines issued vide OM No. 4/1/2018-(BP&E)(Part-I) dated 2nd December 2021 which were revisited, particularly, with reference to parameters to be considered for determining quality of B- Hy molasses and evolving criterion for assessing ethanol production mechanism from grains such as maize, damaged food grains like broken rice, surplus rice sourced from FCI etc.

**Part-I**

**Definitions:**

- i. Sugarcane juice shall mean, primary juice, secondary juice, mixed juice and clear juice as obtained by sulphitation or defecation process in a vacuum pan sugar factory.
- ii. Sugar syrup shall mean concentrated sugarcane juice having total dissolved solid content not less than 50<sup>0</sup> as indicated by brix. Below 50<sup>0</sup> brix it may be treated as thick juice or juice depending upon the concentration as indicated by brix% in a vacuum pan sugar factory.
- iii. Sugar for this purpose shall mean white or off-colour or moist sugar having pol percent not less than 98.0 produced by vacuum pan process.
- iv. B-Heavy molasses shall mean the molasses obtained as a result of curing of B-masseccuite and having purity not less than 50 and 48 in case of plantation white sugar produced by Double Sulphitation Process and raw sugar produced following Defecation Process of Clarification respectively.
- v. Grains shall mean maize, damaged food grains like broken rice, surplus rice sourced from FCI, the rice being provided under Open Market Sale Scheme (OMSS).

**Part-II**

**General Recommendations:**

- i. During sugar season/ethanol year 2022-23, the vacuum pan sugar factories & ethanol units to obtain a process validation report from technical institute viz. National Sugar Institute (NSI), Kanpur/Vasantdada Sugar Institute (VSI) Pune or any technical institute designated by State Government. For the subsequent years, such validations shall be required, if no such validation has been carried out earlier, in case of any changes in the guidelines or changes made by the

  
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- sugar factories & ethanol units at their end with respect to processing system and feed stock.
- ii. The process validation report is to be provided to the State Excise officials or any competent authority as designated by State Government by the concerned unit.
  - iii. The validating agencies shall provide a copy of validation report to Directorate of Sugar & Vegetable Oils, Department of Food & Public Distribution, Krishi Bhawan, New Delhi within a fortnight of undertaking the onsite validation.
  - iv. The validating agencies shall provide a copy of validation report to Ministry of Petroleum and Natural Gas, Shashtri Bhawan, New Delhi within a fortnight of undertaking the onsite validation.
  - v. The ethanol produced through different routes i.e. B-heavy molasses, cane juice, sugar syrup and sugar or from grains such as maize, damaged food grains like broken rice, surplus rice sourced from FCI is to be certified by the concerned state excise department or any authority as designated by State Government with unique serial no. for proper identification. Such certificate for grains shall clearly indicate the type of grain used i.e. Maize or corn, damaged food grains or surplus rice sourced from FCI.
  - vi. In case of a vacuum pan sugar factory, if two separate processing streams from cane crushing to sugar bagging and molasses storage are available and proper recording of data of two streams with respect to quantities & qualities is made, factory may divert two different class of feed stocks from two streams.
  - vii. The quality of the ethanol produced by any of the routes should conform to the desired specifications as per IS 15464 (2022): Anhydrous Ethanol for use in Automotive Fuel or as per the requirement of OMC's. As specified in their tender document, the ethanol content % by volume shall not be below 99.6 at 15.6 deg. C.
  - viii. The distilleries i.e. ethanol units shall be operated with one type of feed stock at a time i.e.
    - a. C-Hy molasses
    - b. B-Hy molasses
    - c. Sugarcane juice/ Sugar syrup/Sugar.
    - d. Surplus rice sourced from FCI
    - e. Damaged Food Grains like broken rice and
    - f. Maize

However, in case of ethanol unit having two identifiable processing streams, they may use different class of feed stocks for the two streams subject to proper recording of data of two streams with respect to quantities & qualities.

- ix. The validating agency shall specify the loss in sugar recovery due to diversion, sugar recovery during the diversion and estimated sugar recovery considering no diversion of juice/syrup or B Heavy molasses so as to facilitate calculation of FRP for sugarcane etc.

  
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## Part-III

### A. Diversion of B-Hy Molasses:

1. The C-Hy and B-Hy Molasses from respective centrifugals to be collected in separate receiving tanks i.e. "run off tanks". The C-Hy molasses and B-Hy molasses "run off" and storage tanks should have proper identification labelling in different colours e.g. for C-Hy molasses the labelling may be in darker brown, whereas, for the B-Hy molasses it can be lighter brown. Similar colour coding to be provided for their respective pipe lines in the sugar factory wherever used.
2. Separate pumps with no interconnecting pipe lines to be used for both types of molasses so as to send them to the respective storage tanks available in the vacuum pan sugar factory having proper identification marks. Under the normal circumstances, no underground pipelines shall be used for the purpose.
3. While diverting B-Hy molasses, boiling of C or other down the line massecuite shall not be allowed. Separate storage facilities to be provided for C-Hy & B-Hy molasses and any intermixing of the two different qualities of molasses shall be avoided. However, during the period when B- Heavy molasses is diverted, the vacuum pan sugar factories are allowed to use the existing C-Heavy molasses storage facilities subject to validation of their storage plan by NSI/VSJ or any competent authority as designated by State Government and with prior information/approval of the state excise officials.
4. If a vacuum pan sugar factory envisages on & off switching to B and C massecuite boiling during the season, earmarked plant and machinery for the two quality of massecuites shall have to be used and use of C massecuite pans, crystallizers and curing facilities etc. shall not be allowed for B massecuite. However, if no C massecuite boiling is to be undertaken during the entire season, the same may be allowed.
5. Maxwell Bolougne type weighing scales or load cell based weighing system etc. to be provided to ascertain the respective molasses sent out of the process house of the sugar factory to the respective storage tanks. Alternatively, the factories may use calibrated mass flow meters with check weighment facility.
6. Like wise to measure and record the consumption of the two types of molasses for ethanol production, separate system for the liquidation to be provided in the respective storage tanks having separate pumps with a Maxwell Bolougne type weighing scale or load cell based weighing system or installing calibrated mass flow meters in the discharge line with check weighment facility. After the flow meters or weighing system, the molasses may be sent out through a common line.
7. Proper recording of production, dispatch of each type of molasses is to be made in separate log books on two hourly basis while stock taking to be made on day to day basis by the vacuum pan sugar factory.
8. In case, the vacuum pan sugar factory gives an undertaking to produce and divert only B- Heavy molasses, the distilleries as per para (3) may be allowed to use the existing C-Heavy molasses storage and ethanol storage facilities with prior information/approval of the state excise officials or any competent authority as designated by State Government.



9. The important quality parameters viz. Brix, Purity, TRS (Total reducing sugar) content of B-Hy molasses sent from the processing house to be recorded on day to day basis by the sugar mill. Such analysis is also to be carried out and recorded by the vacuum pan sugar factory at the time of dispatch from the storage tanks and by the distillery at the time of its use.
10. B-Hy molasses purity shall not be less than 50 and 48 in case of plantation white sugar produced by Double Sulphitation Process and raw sugar production by Defecation Process of Clarification respectively. An allowance of up to -2% in the purity of B Hy molasses may also be considered if the molasses is kept in storage tanks for over 45 days. For the purpose of sampling, samples of B-Hy molasses shall be drawn both from run off-tank & molasses storage tank for which suitable sampling/tapping points to be provided. Factories undertaking B-Hy diversion shall get the process and figures of molasses diversion validated from NSI/VSI or any competent authority as designated by State Government during each ethanol supply year.
11. The distillery i.e. ethanol unit, to record consumption and stock of molasses, production of ethanol as well as distillation and fermentation efficiency of the plant on daily basis. The distillery i.e. the ethanol unit shall also be required to analyze and record the data with respect to quality of the molasses, including apparent purity and total sugar content on day to day basis. The samples of C-Hy or B-Hy molasses for different parameters and for ethanol content, shall be got analysed once in a fortnight by of NSI/VSI or any NABL accredited laboratory or any competent laboratory as designated by State Government and a record of the same shall be kept. In case of procurement of B-Hy molasses by the ethanol unit from other vacuum pan sugar plants in addition to integrated vacuum pan sugar plant, complete record of the same viz. source, quantity & quality shall be kept. The B-Hy molasses purity should be recorded by vacuum pan sugar factories while sending it out of the process house to storage tank and also when it is transferred to integrated ethanol unit or sold.
12. It would be essential to weigh and record the quantity of molasses used and ethanol produced from such molasses to ascertain the yield and potential.
13. Due to the diversion of intermediate molasses i.e. B-Hy molasses instead of the conventional final molasses i.e. C-Hy or C-molasses, additional sugar loss is bound to occur resulting in lowering of sugar recovery by the factory but enhancing the ethanol production. Thus, sugar recovery should be estimated by using the following formula:

$$\text{Sugar Recovery \% Cane} = \text{Pol in Mixed Juice \% Cane} \times \frac{(J - 35.60) K}{0.644J}$$

(Where J is the purity of mixed juice and value of K may be considered as 1.002 for deemed production of plantation white sugar).

14. Vacuum pan sugar factories having distillery or those not having re-distillation facility, such factories may be allowed divert /transport/sale B Heavy molasses for re-distillation to other distillery for Ethanol production. However, necessary



certification from regional state excise/concerned state officials may be necessary and required registration in supply chain management portal/information to concerned agencies shall be essential.

15. In case of trade/sale/diversion of B-Heavy molasses as per para 12 above, proper recording of dispatch & receipt with respect to quality (Brix%, Purity and TRS%) & quantity to be maintained by the seller and the purchaser. For a standalone distillation unit undertaking ethanol production, relevant guidelines as in the case of distilleries integrated with sugar factories in respect of storage, weighment, colour coding, maintenance of records, quality of B-heavy molasses shall be applicable & validation of the process by NSI/VSI or any other competent authority as designated by State Government shall also be applicable.
16. The vacuum pan sugar plant selling the B-Hy molasses in open market shall also be required to get the process validated by above mentioned authorities.
17. The vacuum pan sugar units undertaking diversion of B Hy molasses shall submit every month a consolidated statement about quantity of B Hy molasses produced, quantity of B Hy molasses %cane, quantity diverted/sold, quality in terms of purity and total reducing sugar content to the same agency which validates the process. Similarly, data shall be submitted by the ethanol units with respect to quantity of B Hy molasses utilized during the month, quality in terms of brix, purity and total reducing sugar content, ethanol produced, yield of ethanol/ton of B Hy molasses to the same agency which validates the process every month.

**B. Diversion of Sugarcane Juice/ sugar syrup:**

1. Separate calibrated mass flow meters or load cell based weighing scales of appropriate capacity shall be provided in vacuum pan sugar factories to ascertain the quality and quantity of juice/syrup diverted for ethanol production.
2. In case of partial diversion, no any interconnecting pipe lines/by-pass arrangement shall be used. The juice/syrup diverted to the ethanol unit shall be stored in separate storage tanks having proper identification marks with the storage tanks and pipelines in yellow colour. Under the normal circumstances, no underground pipelines shall be used for the purpose of delivering the juice/syrup.
3. Proper recording of juice/syrup dispatches to be made in log books by the vacuum sugar factory. Recording of juice/syrup received, its consumption, ethanol production, distillation and fermentation efficiency shall be made on daily basis, by the distillery. In case of procurement of juice/syrup by the ethanol unit from other vacuum pan sugar plant in addition to integrated vacuum pan sugar plant, complete record of the same viz. source, quantity & quality wise per lot procured shall be kept. The same procedure shall be followed by stand-alone ethanol units to get the process validated from NSI/VSI or any competent authority as designated by State Government during each ethanol supply year. The vacuum pan sugar plant selling the sugarcane juice/syrup in open market shall be required to get the process validated by above mentioned authorities.
4. Important parameters with respect to quality of diverted juice/syrup viz. Brix, Purity, TRS (Total reducing sugar) content to be recorded on four hourly basis by



the sugar factory and distillery. In case, the vacuum pan sugar factory opts for converting the form of juice or syrup through inversion & concentration etc., the validating agencies shall validate the process for its suitability, possible ethanol yield & any possible difference in two cases.

5. In case of entire juice/syrup diversion, estimated sugar recovery may be calculated by using the following:

$$\text{Sugar Recovery \% Cane} = \text{Pol in Mixed Juice \% Cane} \times \frac{(J - 35.60) K}{0.644 J}$$

(Where J is the purity of mixed juice and value of K may be considered as 1.002).

6. In case, the sugar factory undertakes partial diversion of juice/syrup, the sugar recovery shall be calculated by taking into account i.e. factorizing, the quantity of juice/syrup diverted and actual purity of final molasses being obtained.
7. The vacuum pan sugar units undertaking diversion of sugarcane juice/syrup shall submit every month a consolidated statement about quantity of juice/syrup produced & diverted or sold, quantity of juice/syrup %cane, quality in terms of purity and total reducing sugar content to the same agency which validates the process. Similarly, data shall be submitted by the ethanol unit with respect to quantity of sugarcane juice/syrup utilized, quality in terms of brix, purity and total reducing sugar content, ethanol produced, yield of ethanol/ton of sugarcane juice or syrup to the same agency which validates the process, every month.

**C. Diversion of Sugar:**

1. Proper accounting shall be maintained for sugar dispatches by the vacuum pan sugar factory and consumption of sugar by the distillery on day to day basis.
2. Necessary sugar mingler, melter etc. shall be provided in the distillery along with mass flow meters and check weighment system so as to ascertain flow of sugar melt into the process.
3. Sugar shall be processed exclusively or along with sugarcane juice or sugar syrup only.
4. While processing such sugar along with other feed stocks, proper accounting shall be maintained about sugar dispatches by the vacuum pan sugar mill and consumption of sugar and other feed stock by the distillery on day to day basis.
5. The vacuum pan sugar mill shall also maintain account of sugar diverted for production of ethanol while calculating the sugar recovery
6. The data regarding receipt of sugar, ethanol production, dispatch and in stock, fermentation and distillation efficiency shall be recorded by the ethanol unit on day to day basis.
7. The ethanol unit, integrated with sugar unit or standalone shall submit a work plan for arriving at ratio of sugar to other feed stocks which will require validation by NSI/VSI or any competent authority as designated by State Government. The ethanol unit shall keep a complete record of source of procurement of vacuum





pan sugar, quantity consumed alone or with other feed stocks, quality of sugar and shall submit details on monthly basis to the same agency which validates the process.

**D. Diversion of Specially Denatured Spirit for Ethanol Production:**

1. In case a standalone ethanol unit resorts to conversion of Specially Denatured Spirit made from cane juice/syrup/B Heavy molasses/Sugar for production of ethanol, it would be necessary to validate the process through NSI/VSI/other competent authority at the end of sugar factory(s) undertaking diversion of Cane juice/Sugar Syrup/B Heavy molasses/Sugar, distillery(s) producing specially denatured spirit from such diverted stream and also at the end of standalone unit converting such spirit to ethanol.
2. The other modalities mentioned in earlier paragraphs viz. recording of data with respect to purchase and sale, quantity and quality of feed stock & ethanol produced, operational conditions, colour coding and storage etc. shall have to be adhered to by the participating units.
3. Necessary certification from regional state excise/concerned state official shall be necessary and required registration in supply chain management portal/information to concerned agencies shall be essential.
4. Proper recording of dispatch & receipt with respect to quality of feed stock i.e. cane juice/syrup/B Heavy molasses/Sugar (Brix%, Purity and TRS%, as applicable) & quantity to be maintained by the seller and the purchaser. In addition to this such records with respect to quality and quantity of Ordinary Denatured Spirit (ODS) to be maintained by the seller(s) and the purchaser.

**E. Utilization of Grains for Ethanol Production:**

1. Adequate storage facilities viz. silos of appropriate capacity shall be provided in case the ethanol units envisage production of ethanol by using surplus rice sourced from FCI, damaged food grains like broken rice and maize for separate storage of each type of feed stock.
2. Proper accounting for each type of feed stock with regard to source, quantity procured, consumed and in stock shall have to be maintained. Proper records with respect to procurement of each type of feed stock viz. tax/sale invoices etc. shall be maintained.
3. To facilitate the same, the unit shall ensure availability of lorry or other suitable weighbridges to be calibrated from time to time. A record of the calibration shall have to be maintained.
4. The ethanol unit shall also maintain a record of important quality parameters viz. starch, protein and moisture content etc. in the raw material for different lots and also on day to day basis.
5. The data regarding ethanol production, dispatch and in stock, fermentation & distillation efficiency and yield of ethanol per ton of feed stock shall be recorded by the ethanol unit on day to day basis.

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6. The ethanol unit shall process one category of feed stock at a time. In case of dual feed stock based ethanol units (working on feed stocks from sugar units and grains), similar considerations shall be applicable.
7. Separate ethanol storage capacities shall have to be provided for ethanol produced from different feed stocks i.e. surplus rice sourced from FCI, damaged food grains like broken rice and maize. In case of dual feed stock based ethanol units (working on feed stocks from sugar units and grains), similar considerations shall be applicable.
8. Such ethanol units to get the process validated from NSI/VSI or any competent authority as designated by State Government during each ethanol supply year for the above and ensure production of ethanol with DDGS as being the by-product.

F. **Storage capacity of Molasses and Ethanol Tanks:**

The ethanol units shall ensure availability of adequate storage capacity to commensurate their operational capacities. These may be considered as 45 days for ethanol and 60 days for molasses in case of standalone ethanol units. For ethanol units integrated with sugar units, these may be considered as 45 days and 30 days for ethanol & molasses respectively. The storage tanks may be allowed to be interchangeably used with due permission of excise or concerned state officials.

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