



# Standard Guide for Sensory Evaluation of Beverages Containing Alcohol<sup>1</sup>

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## 1. Scope

1.1 This guide provides guidelines specific to the sensory evaluation of beverages containing alcohol, including beer, wine, coolers, cocktails, liqueurs, and distilled spirits.

1.2 This guide addresses safety, legal, panel selection, sample preparation, and test procedures specific to beverages containing alcohol.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 This guide does not recommend a specific test method.

## 2. Significance and Use

2.1 The procedures recommended in this guide can be used for the sensory evaluation of beverages containing alcohol.

2.2 This guide provides practical suggestions to maximize panelist safety and to minimize the risks and liabilities of the person or corporation responsible for administering the sensory evaluation of beverages containing alcohol.

2.3 This guide also provides practical suggestions when dealing with various government agencies that are involved in distributing beverage alcohol test products.

## 3. Safety

NOTE 1—See also Fig. 1 and STP 913 (1).<sup>2</sup>

3.1 *Medical Condition*—Potential panelists must be in good medical condition with no serious health problems. Inform them that they should not participate on panels if they are taking prescription or over-the-counter medications, which are contraindicated when combined with alcohol.

3.2 *Home-Use Testing:*

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<sup>2</sup> The boldface numbers in parentheses refer to the list of references at the end of this standard.

3.2.1 Home use tests with beverages containing alcohol are often used to determine how products are consumed. Transportation and storage of high proof spirits are very important. In addition to an informed consent form (see 5.2.1), it is recommended that the following statements accompany products used in home-use testing:

3.2.1.1 The sponsor of this study is a well-known major manufacturer who considers the health and safety of research participants and the public to be of the utmost importance.

3.2.1.2 Specific guidelines that must be followed while participating in this product test are listed as follows. Compliance with these guidelines is necessary to ensure that the beverage alcohol product you are given is consumed in a responsible manner. Please read and follow these guidelines carefully.

(1) Do not open test product(s) until you arrive home.

(2) If you are driving, you must transport the test product to your home in the trunk of your car.

(3) Do not drive or operate heavy machinery after sampling test product(s).

(4) Do not leave the test product(s) in a place where it is accessible to individuals under the legal drinking age.

(5) If there is a need to return used beverage containers, you must empty the container completely because it is illegal to transport open containers of beverage alcohol.

3.3 *Central Location or Intercept Testing:*

3.3.1 Safety is most critical in situations where consumers evaluate beverage alcohol products at a central location. There are several steps that can be taken to ensure respondent safety:

3.3.1.1 Provide transportation to and from the test location.

3.3.1.2 Have a certified bartender or highly trained professional provide each respondent with the test products. Instruct the bartender or professional not to serve respondents whom exhibit any signs of intoxication. The Hotel, Tavern, and Restaurant Association in each state offers techniques in alcohol management courses. It is recommended that all servers complete this course.

3.3.1.3 Limit the sample volume for evaluation to an amount which will ensure the respondent will not have a blood alcohol level greater than a legal limit (see 8.3.1.3).

3.4 *Employee Panels:*

3.4.1 When employees evaluate product(s) at their workplace, the sensory professional has additional control.

The Sponsor, (a well-known major manufacturer) of the research in which you will participate, engages in product testing and evaluation research to maintain and improve the quality of its products. As a participant in such research, you may be offered the opportunity to sample small quantities of alcoholic beverages. You are never required to sample such beverages, nor are you required to finish any beverage you elect to sample. Indeed, the decision as to whether to sample any product offered during the research is yours alone, and you alone should determine how much of the sample you wish to consume.

The Sponsor considers the health and safety of research participants and the public to be of utmost importance. Therefore, you should refrain from sampling any alcoholic beverage offered as part of this research if you have been advised by your doctor or if you have any medical reason to refrain from consuming alcoholic beverages (beer, coolers, wine or distilled spirits).

You should also refrain from sampling any alcoholic beverage on a given day if:

- you have consumed any beer, coolers, wine or distilled spirits on that day.
- you are taking any prescription or over-the-counter (non-prescription) medication and you have been advised by your doctor, or the label or instructions state, that you should refrain from consuming alcoholic beverages while taking the medication.

In addition, Federal Law requires that alcoholic beverage labels contain the following statement:

**GOVERNMENT WARNING:**

1. According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects.
2. Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery and may cause health problems.

Futhermore, you should follow your doctor’s advice if you are pregnant, attempting to become pregnant, or nursing.

You may be asked by the person conducting the research in which you are participating or by other facility personnel to remain at this facility for a period of time after your last sampling of an alcoholic beverage. Moreover, if you appear to be impaired at the end of such time period, you will be provided with an alternative means of transportation to your home and arrangements will be made for you to return at a later date for your car, at the Sponsor’s expense.

You acknowledge and agree that you have read this Statement of Policy and fully understand its contents. You further acknowledge that you are of legal drinking age. You further agree that you will release the Sponsor from claims of any nature relating to your participation in this research.

Name of Participant: \_\_\_\_\_ Age: \_\_\_\_\_  
 (Please Print)  
 Signature of Participant: \_\_\_\_\_ Date: \_\_\_\_\_  
 Address: \_\_\_\_\_

**FIG. 1 Sample Sponsor’s Statement of Policy**

This control involves scheduling panels such that employees can remain at the workplace until their blood alcohol content is reduced below legal limits (see 8.3.1.3) to drive or operate machinery.

3.4.1.1 Special considerations need to be taken when panelist’s work involves the operation of equipment or any work task that can jeopardize the safety of others:

3.4.2 Do not allow these employees to be panelists.

3.4.3 Arrange with employee management “waiting times” after product evaluation before these employees can resume work involving these safety related work activities. Require a blood alcohol (breath analyzer) test prior to allowing the employee to resume safety-related work activities.

3.4.4 Limit the sample volume for evaluation to an amount which will ensure the employee will not have a blood alcohol level greater than a legal limit (see 8.3.1.3).

**4. Regulatory**

4.1 Investigate and meet federal, state, and local regulations whenever studies are to be conducted that include the storage, handling, shipping, serving, or consumption of beverages containing alcohol.

4.2 Some state or local communities do not allow testing of beverage alcohol. Those states that do allow testing of beverage alcohol each have different regulations and procedures. The following guidelines are recommended:

4.2.1 Determine if the facility is required to have a liquor license or be bonded to conduct the study. This information is available from local State agencies such as beverage control commissions and from federal agencies like the Tax and Trade Bureau (TTB).

4.2.2 Research and meet State and Federal regulations for the shipping, handling, receiving, storing and disposing of alcoholic beverages. Some relevant agencies are: State liquor control boards, Tax and Trade Bureau (TTB), Food and Drug Administration (FDA), and Occupational Safety and Health Administration (OSHA).

4.2.3 Research and meet regulations for the serving of beverage alcohol. For example, some states require the use of a certified bartender. See 8.3.1.3 for an example of legal consumption levels. Note that these levels may change from state to state and from country to country.

4.2.4 Store material safety data sheets (MSDS) for ethanol on the study site premises, and make available upon request from participants. Also make available MSDS sheets for compounds used as reference standards or sensory training.

## 5. Legal Liability

5.1 There is a risk of legal liability whenever beverages containing alcohol are tested. To minimize these risks, it is recommended that the guidelines in 5.2 and 5.3 be used.

### 5.2 Consent Forms:

5.2.1 Prepare consent forms for each product evaluation session (see Fig. 1).

5.2.1.1 Describe the nature of the study. For example, the sentence, “You may or may not be served beverages that contain alcohol,” can be used to obtain informed consent.

5.2.1.2 Outline the time period over which testing will be conducted.

5.2.1.3 Include all the federal alcohol warning information (see Fig. 1).

5.2.1.4 Indicate that in order for the candidate to participate in the study they must be in good health and are willing to participate as evidenced by the signing of the informed consent form.

5.2.1.5 Indicate that participants can be excluded from the study for specific reasons including pregnancy, taking prescribed medications, current illnesses, and alcohol abuse. Furthermore, indicate that if any of the exclusion circumstances arises during the course of the study it is the participant’s responsibility to bring it to the organizer’s attention. This is particularly important for long-term studies, where periodic reviewing and signing of consent forms may be necessary.

5.2.1.6 Under certain circumstances, include a list of ingredients on the consent form mentioning all of the products to be tested. For example, ingredients not commonly associated with alcoholic beverages such as caffeine, Aspartame,<sup>TM</sup> or capsicum should be identified on the consent form.

5.2.1.7 Include statements indicating that participants can be removed from the study without consent at any time.

5.2.1.8 Each participant is required to provide appropriate validation of legal age to consume beverages containing alcohol. Record this validation on the consent form. Note that

laws concerning legal drinking age vary from country to country and may vary within a country.

5.2.1.9 Upon completion of reading the consent form, ensure that the participant understands the form and has no questions. After being allowed ample time to review the contents of the consent form, the participant must sign and date the consent form in the presence of a witness.

### 5.3 Other:

5.3.1 Review and follow the items described in Section 3 to further reduce the risk of liability.

5.3.2 Post government warnings for the consumption of alcoholic beverages on test premises and on test products.

5.3.3 In home-use studies, label each product as a test sample and not for sale.

## 6. Panel Selection

6.1 Consider safety, regulatory, and liability issues as discussed in Sections 3 – 5 when selecting participants specifically for a beverage alcohol panel. For general information on panel selection criteria, consult MNL 26 and STP 758 (2 and 3).

### 6.2 Special Considerations on Panel Selection Criteria:

6.2.1 Age—All panelists must be of legal drinking age. Confirm their age by using picture identification cards, such as a driver’s license or other photo identification card (only if date of birth is listed on the card).

6.3 Drinking Habits—Product abuse is a criterion for exclusion for all beverage alcohol tests. Do not use individuals who indicate that they consume more than two 1-oz drinks of high-proof spirits daily or a six-pack of beer a day.

6.4 Recruitment—Contact the potential panelist directly to reduce the risk of including individuals with alcohol abuse problems. For example, it is not recommended that panelists be recruited through means such as media advertisements, flyers, word of mouth, etc. Also, the recruiter must be fully aware of the legal, safety, and specific panel considerations prior to running the test.

6.5 Religious and Moral Considerations—Do not use individuals if drinking beverage alcohol interferes with or contradicts their religious or moral beliefs.

## 7. Sample Preparation

7.1 Proper sample preparation and presentation for sensory analysis is critical to generating consistent and meaningful information. Use of the sample preparation guidelines in 7.2 – 7.8.2 are therefore recommended.

7.2 In general, prepare samples in the same way that consumers would use the product. Evaluate beverage alcohol at standard temperatures.

7.2.1 Present cold beverage alcohol products at approximately 3 to 7°C.

7.2.2 Present room temperature beverage alcohol products at approximately 21 to 24°C.

7.2.3 Present hot beverage alcohol products at approximately 66 to 71°C.

7.3 Beverage alcohol products that are used with mixes can be presented straight or in the mix. When a mix is to be used, it is recommended that a master batch of the mix be prepared to a volume that can be used for the entire study. If this is not possible, the mix should be screened before use for flavor consistency throughout the study.

7.4 Beverage alcohol products that are used with other food products can be presented for evaluation straight or with the food product. Screen these food products for consistency before each sensory evaluation.

**7.5 Dilution:**

7.5.1 In some beverage alcohol products, dilution is recommended to reduce the ethanol bite and burn that can interfere with sensory analysis.

7.5.2 Common diluting liquids include spring water, demineralized water, or distilled water which all contribute little to the flavor of the beverage alcohol product being evaluated.

7.5.3 Dilution levels should be determined according to the percent ethanol in the product.

7.5.3.1 In general, beer and wine products do not require dilution.

7.5.3.2 A 50/50 dilution is recommended for most distilled spirits. More or less dilution may be required depending on the proof of the sample.

**7.6 Glassware:**

7.6.1 Samples should be presented in clean, odor- and flavor-free containers that are consistent with common practices. For example, wine can be evaluated using wine glasses and brandy snifters.

7.6.2 Glass containers should be used whenever possible.

7.6.3 Containers made of other materials, including plastic resins, can be used as long as they are prescreened and found to contribute no odor or flavor to the beverage alcohol sample.

7.6.4 Containers may be chilled or heated to the same temperature that the beverage containing alcohol will be evaluated to avoid extreme changes in the sample's temperature.

**7.7 Timing:**

7.7.1 Samples should be evaluated in a timely fashion and consistent with the product's use.

7.7.2 Samples that require heating or cooling should be presented for analysis as quickly as possible after preparation

to ensure the evaluation is conducted within the acceptable temperature ranges as described in 7.2.1 – 7.2.3.

7.7.3 Some products, such as certain wines, should be allowed to sit for a standard amount of time after they are opened before they are presented for sensory evaluation.

7.7.4 Carbonated Beverage alcohol, such as beer and wine coolers, should be presented for evaluation as quickly as possible after preparation to reduce the risk of large changes in the carbonation which can dramatically alter the sensory attributes.

**7.8 Pouring:**

7.8.1 Beverage alcohol samples should be poured into evaluation vessels carefully and consistent with usage.

7.8.2 It is recommended that beer be poured directly down the center of the glass to result in half a glass of liquid and a quarter glass of foam. This helps to standardize the liberation of flavor aromatics through foaming.

**8. Procedure**

NOTE 2—Refer to MNL 13 and STP 433 (4, 5).

8.1 In addition to good sensory practices, there are special considerations when testing beverages containing alcohol. These special considerations are listed as follows.

8.2 *Palate Cleansing*— Distilled, demineralized, or deionized water, seltzer, or club soda can be used as a rinse between product tasting. Any one of these rinses can be used with unsalted crackers to clean the palate.

**8.3 Alcohol Burn and Safety Factors:**

8.3.1 There are two factors that limit the number of samples and sample volumes that can be tested.

8.3.1.1 *Number of Samples Tested*—The number of samples should be limited as much as possible to reduce the effects of alcohol burn.

8.3.1.2 *Interstimulus Interval*—The interstimulus interval or the time between sample tasting, is determined by the alcohol content of the product and the test objectives. Generally, the higher the alcohol content, the longer the interstimulus interval. The longer interval, plus palate cleansing with crackers and rinse, will help to dissipate the alcohol burn of high-proof spirits.

8.3.1.3 *Multiple Sample Limitations*—The number of samples that a panelist is allowed to evaluate in one session

**TABLE 1 Blood Alcohol Concentration (B.A.C.) Chart  
(Percent of Alcohol in Bloodstream)**

Your Weight (lb)	Number of Drinks <sup>A</sup> Consumed								
	1	2	3	4	5	6	7	8	9
100	0.029	0.058	0.088	0.117	0.146	0.175	0.204	0.233	0.262
120	0.024	0.048	0.073	0.097	0.121	0.145	0.170	0.194	0.219
140	0.021	0.042	0.063	0.083	0.104	0.125	0.146	0.166	0.187
160	0.019	0.037	0.055	0.073	0.091	0.109	0.128	0.146	0.164
180	0.017	0.033	0.049	0.065	0.081	0.097	0.113	0.130	0.146
200	0.015	0.029	0.044	0.058	0.073	0.087	0.102	0.117	0.131
220	0.014	0.027	0.040	0.053	0.067	0.080	0.093	0.106	0.119
240	0.012	0.024	0.037	0.048	0.061	0.073	0.085	0.097	0.109

<sup>A</sup> One drink equals: 1 oz of 80 proof alcohol; 12-oz bottle of beer; 2 oz of 20 % wine; 3 oz of 12 % wine. Entries represent typical values in adults.

should be limited to remain within the consumption guidelines published in **Tables 1 and 2**. Also, the number of sessions throughout the course of a day should be limited based on a number of factors including, but not limited to, the total amount of alcohol consumed, the length of time of each session, the total time spent at the testing facility, the total number of samples presented, the time of day, and panelist fatigue. **Table 1** shows the percent of alcohol in the bloodstream (Blood Alcohol Concentration or B.A.C.) as a function

of body weight and number of drinks consumed. **Table 3** indicates that time is the only way to reduce your blood alcohol level. The legal driving under the influence (DUI) B.A.C. varies from state to state in the United States and varies from country to country. In the United States, depending on the state, the legal DUI B.A.C. is either 0.08 or 0.10 (as of September 1, 1999). In some countries, the legal DUI B.A.C. is as low as 0.02. The researcher is responsible for checking the local laws where beverage alcohol testing is to be conducted. **Table 2**

**TABLE 2 Recommended Serving Volume Per Sample in Liquid Ounces (29.6 mL)/Session**

NOTE 1—Alcohol strength in U.S. proof is twice the content by volume. For example, a product labeled 80 % proof contains 40 % v/v alcohol.

Sample Proof Alcohol by Volume	Number of Samples				
	1 oz	2 oz	3 oz	4 oz	5 oz
5	20.00	10.00	6.67	5.00	4.00
10	10.00	5.00	3.33	2.50	2.00
15	6.67	3.34	2.22	1.67	1.33
20	5.00	2.50	1.67	1.25	1.00
25	4.00	2.00	1.33	1.00	0.80
30	3.33	1.67	1.11	0.83	0.67
35	2.86	1.43	0.95	0.72	0.57
40	2.50	1.25	0.83	0.63	0.50
45	2.22	1.11	0.74	0.56	0.44
50	2.00	1.00	0.67	0.50	0.40
55	1.82	0.91	0.61	0.46	0.36
60	1.67	0.84	0.56	0.42	0.33
65	1.54	0.77	0.51	0.39	0.31
70	1.43	0.72	0.48	0.36	0.29
75	1.33	0.67	0.44	0.33	0.27
80	1.25	0.63	0.42	0.31	0.25
85	1.18	0.59	0.39	0.30	0.24
90	1.11	0.56	0.37	0.28	0.22
95	1.08	0.54	0.36	0.27	0.22
100	1.00	0.50	0.33	0.25	0.20
105	0.95	0.48	0.32	0.24	0.19
110	0.91	0.46	0.30	0.23	0.18

**A Worked Example Using the Formula**

1. A researcher wants to have panelists evaluate two vodka samples, each of which is 86°.
2.  $SP1 \times SV1 = SP2 \times SV2$   
 $SP1 = \text{sample proof} = 86^\circ$   
 $SV1 = \text{total volume to be given to panelists} = \text{unknown}$   
 $SP2 = \text{“standard drink” proof} = 100^\circ$   
 $SV2 = \text{“standard drink” volume} = 1 \text{ oz } (\sim 30 \text{ mL})$
3.  $86 \times SV1 = 100 \times 1$
4.  $SV1 = 100/86$
5.  $SV1 = 1.16 \text{ oz}$
6.  $1.16 \text{ oz}/2 \text{ samples} = 0.58 \text{ oz/sample}$ .
7. Thus, the researcher should serve each panelist two vodka samples of 0.58 oz each.

**How To Use the Recommended Serving Volume Table**

1. Determine the proof of the sample that you want to test. Proof is expressed in alcohol by volume and is twice the percent alcohol level. For example an 80° product is 40 % alcohol.
2. Determine the number of samples that you wish to be evaluated.
3. The value in the table is the maximum recommended amount of each sample in ounces. This value is based on “the standard drink.” The standard drink” is one ounce of 100° product or equivalent.
4. For values not on the table, use the following formula to calculate the recommended total serving volume for one sample. You can then divide the SV1 value by the number of samples you want your panelists to evaluate.

$$SP1 \times SV1 = SP2 \times SV2$$

where:

- SP1 = sample proof
- SV1 = total volume to be given to panelists
- SP2 = “standard drink” proof = 100°
- SV2 = “standard drink” volume = 1 oz (~30 mL).

**A Worked Example Using the Recommended Serving Volume Table**

1. A researcher wants to have panelists evaluate three liqueur samples, each of which is 30°.  
NOTE—If the samples vary in proof, either take the mean proof or use the highest proof to calculate sample volume.
2. The Recommended Serving Volume Table indicates that each panelist should receive three samples of 1.11 oz each.

**TABLE 3 Time is the Only Way to Reduce Your B.A.C.<sup>A</sup>**

If Your B.A.C. Is (%)	Hours to Reach B.A.C. % Below		
	0.000	0.050	0.100
0.025	1.7		
0.050	3.3		
0.075	5.0	1.7	
0.100	6.7	3.3	
0.125	8.3	5.0	1.7

<sup>A</sup> Alcohol is burned by our body at 0.015 %/v/v/h. This chart shows how many hours it takes to reduce your B.A.C. from various levels. Entries represent typical values in adults (6).

shows the recommended serving volume per sample per session. To minimize risk, the serving volumes indicated in **Table 2** are recommended. If the recommendations in **Table 2** are followed, then no one will reach the current legal DUI B.A.C. in any state in the United States.

**8.4 Time of Day**—Beverages containing alcohol can be tested any time of day. It is not advisable, however, to test right before employees leave for the day because of the danger of drinking and driving. It is recommended that testing end 1 h before quitting time. Also, because people generally are more tired later in the day and ethanol is a central nervous system depressant, it is best not to serve alcohol at the end of the employee's day.

**8.5 Panelist Instructions**—When evaluating beverages containing alcohol, instructions as to how the samples should be evaluated are very important, for example, swallow, expectorate, or as normally consumed. Panelist compliance can be verified by monitoring the amount consumed or requesting comments on taste, flavor, or aftertaste.

**8.6 Experimental Design**—Unlike many other products, beverage alcohol is unique in that there is a recommended serving volume per sample (see **Table 2**). When designing experiments to test beverage alcohol, keep in mind that there is a limit to the amount of sample that each panelist can consume at a given time. This requirement especially is constraining when designing screening, mixture, or response surface experiments. This constraint usually makes beverage alcohol more expensive to test than most other products. In addition, beverage alcohol can alter sensory perceptions and can produce changes in mood, even in small amounts. These panelist

changes in perception or mood can result in increased error in the experiment and affect study results. By staying within the recommendations given in this guide, however, the effect of the alcohol level on sensory perceptions and mood can be minimized.

**8.7 Server Training**—Evaluating beverage alcohol may produce unwanted side effects, such as intoxication. To minimize the risk associated with testing beverage alcohol, it is recommended that test supervisors and servers be trained in the techniques of alcohol management. This training covers the following laws concerning the serving of beverage alcohol, which varies from state to state: how to determine if a photo identification card is genuine and how to determine if someone is intoxicated and how to deal with that individual, among other relevant topics. The reader is referred to the National Licensed Beverage Association for more information on such training in each state.

## 9. Public Image

**9.1** It is advisable to create and maintain a positive public image in places where beverages containing alcohol will be tested. This especially is true if consumer testing will be conducted. A positive public image shows potential consumers that the testing location is credible. It also reduces risk of negative publicity sometimes associated with establishments that test beverages containing alcohols. One strategy to enhance public image is to call local newspapers to publicize laboratory openings. Conduct a laboratory tour of the facilities and emphasize all the safety precautions that will be in place to protect the public from intoxicated individuals. Examples of these safety precautions include a highly trained serving staff, careful screening of panelists, and limiting the amount of alcohol served. Point out that in the unlikely event of intoxication, despite all these safety precautions, the company will provide free transportation when necessary.

## 10. Keywords

10.1 alcohol; beverages; beverages containing alcohol; drinking habits; employee panels; experimental design; home-use testing; intoxicated; legal drinking age; liability; panel selection; religious and moral considerations; sensory evaluation; TTB

## REFERENCES

- (1) *Symposium on Physical Requirement Guidelines for Sensory Evaluation Laboratories*, ASTM STP 913, ASTM.
- (2) *Manual on Sensory Testing Methods MNL 26*, ASTM.
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- (4) *Manual on Descriptive Analysis Testing for Sensory Evaluation, MNL 13*, ASTM.
- (5) *Symposium on Basic Principles of Sensory Evaluation*, ASTM STP 433, ASTM.
- (6) Blood Alcohol Content Estimator (for microcomputers) (software on diskette), Department of Transportation, National Highway Traffic Safety Administration, November 1994, NTIS Order Number PB95-501938.

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