

Eclipse Wine (%ABV) Refractometer



User Guide



**Bellingham
+ Stanley**

Eclipse Wine (%ABV) Refractometer User Guide (Eng) & Accessory Items Required to Calculate ABV in beer, wine and cider

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<i>Order Code</i>	<i>Description</i>	<i>Range</i>
45-22	Eclipse Wine (%ABV) refractometer	10 – 135 °Zeiss
44-839	Hydrometer	0.98 to 1.050 S.G.
44-838	Hydrometer Jar	

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Certificate of Conformity

This Eclipse refractometer was calibrated and tested by Bellingham + Stanley and has been found to meet the published specifications for this instrument.

For the refractometer to continue to operate within our specifications, it should be kept in a clean condition and well maintained in accordance with the instruction sheet

This certificate implies no responsibility by Bellingham + Stanley with regard to the accuracy of the instrument after the date of examination at Bellingham + Stanley.

Bellingham+Stanley Ltd.

Longfield Road, Tunbridge Wells,
Kent, TN2 3EY, United Kingdom
Phone: +44 (0) 1892 500400
Fax: +44 (0) 1892 543115
sales@bellinghamandstanley.co.uk

Bellingham+Stanley Inc.

1000 Hurricane Shoals Road, Building D,
Suite 300, Lawrenceville, GA 30043, USA
Phone: 770 822 6898
Fax: 770 822 9165
sales@bs-rfm-inc.com



Application

The alcohol content of a beer, wine and cider can be calculated from the readings of two instruments; an Eclipse Wine (%ABV) refractometer and standard hydrometer measuring specific gravity (S.G.).

Only a few drops of the product are required to obtain a refractometer reading, while the S.G. is measured in the usual way with the hydrometer and hydrometer jar. The process only takes a few minutes to carry out, and an accuracy of about $\pm 0.5\%$ alcohol can be obtained using reasonable care in ensuring that both readings are made at the same temperature.

If the instrument is used with care, and cleaned and maintained as recommended after use, it should give many years of accurate and trouble free service.

Measurement Method:

Equipment required:

- Eclipse Wine (%ABV) refractometer with a “Zeiss scale” (Code 45-22)
- Hydrometer (Code 44-839)
- Hydrometer jar (Code 44-838)
- Pipette (Code 80-080/10 pack of 10) or other suitable applicator

Firstly siphon off enough of the finished product to fill the hydrometer jar to the required level, and leave all the equipment with it in a place free from draughts and direct sunlight for at least an hour to attain room temperature.

Measure the S.G. value (D reading) as accurately as possible and record.

Applying the sample to the refractometer

Lift the illuminator flap, drip the sample on to the prism then close the illuminator flap. View the borderline (light/dark demarcation line) through the eyepiece.

Optical glass is relatively soft and care should be taken not to scratch the prism surface. Do not use metal spatulas or glass rods to apply samples but instead use softer materials such as plastic.

Focussing the scale:

Hold the instrument up to the light and look through the eyepiece. Rotate the eyepiece to focus the scale.

Taking a reading:

Take a Zeiss reading (R reading) from the scale at the border of the light and dark areas. If the scale is completely light then the sample concentration may be too high for the instrument range.

Cleaning the prism:

Thoroughly clean the prism after use with water or other suitable solvent and dry with clean tissue.

The prism surface could be damaged by strong alkalis or acids if left in contact for long periods of time. Clean samples from the prism as soon as practicable.

Wiping the prism surface occasionally with alcohol will remove any build-up of oils left from the samples.

ABV Calculation

The alcohol content can be calculated either by visiting the technical centre on our website and using the %ABV calculator* or alternatively, calculated from the R-D value as shown below to obtain %ABV from the table supplied with the instrument.

$$R-D = R (\text{Refractometer reading}) - D (\text{S.G. value})$$

$$\text{Where } D (\text{S.G. value}) = (\text{S.G.} - 1) \times 1000$$

Examples

Light dry table wine

S.G. = 0.993 & Refractometer reading = 37

D (S.G. value) = $(0.993 - 1) \times 1000 = -7$

R-D = $37 - (-7) = 44$

Alcohol content = 10.7%v/v

Sweet dessert wine

S.G. = 1.015 & Refractometer reading = 72.5

D (S.G. value) = $(1.015 - 1) \times 1000 = +15$

R-D = $72.5 - (+15) = 57.5$

Alcohol content = 15.7%v/v

*New for 2009 – a mobile phone optimised calculator is available for %ABV calculations in remote locations: www.bellinghamandstanley.com/mobile

Precautions to improve accuracy

It is important that both the R and D readings are taken at the same temperature.

Handle the refractometer, the hydrometer and the jar as little as possible.

Make sure that the prism is cleaned and dried between each reading, using a little clean water at room temperature, and a soft cloth to dry.

Leave everything for as long as possible between readings to equalise temperature differences, but without allowing evaporation.

Make sure the scale of the instrument is in sharp focus before taking readings, adjust the eyepiece if necessary.

Look at the quality of borderline obtained. Poor sharpness indicates insufficient sample on prism, or temperature gradients across the prism, or that the prism was not properly cleaned and dried after the last reading.

If in doubt, clean and dry the prism, leave for a while, and repeat measurements from the start. Measuring the same sample twice in quick succession is a useful indication of the reliance that should be placed on the results obtained. Always clean the plastic illuminator plate when cleaning the prism

Calibration

The zero of the refractometer can be checked at any time by using distilled water at 20°C. The R reading should be 15 within ½ a scale division.



Always check sample Health & Safety Data before applying to the refractometer.

When applying samples to the prism which are likely to cause harm to skin or eyes, wear appropriate protective clothing and glasses.

These refractometers are precision optical instruments and should be handled with care. Do not drop or subject them to sharp knocks.

Table 1 – Extended %ABV table – 2 decimal resolution

R-D	%v/v Alc	R-D	%v/v Alc	R-D	%v/v Alc	R-D	%v/v Alc	R-D	%v/v Alc
15.0	0.08	30.0	5.59	45.0	11.10	60.0	16.60	75.0	22.11
15.5	0.27	30.5	5.77	45.5	11.28	60.5	16.79	75.5	22.29
16.0	0.45	31.0	5.96	46.0	11.46	61.0	16.97	76.0	22.48
16.5	0.63	31.5	6.14	46.5	11.65	61.5	17.15	76.5	22.66
17.0	0.82	32.0	6.32	47.0	11.83	62.0	17.34	77.0	22.84
17.5	1.00	32.5	6.51	47.5	12.01	62.5	17.52	77.5	23.03
18.0	1.18	33.0	6.69	48.0	12.20	63.0	17.70	78.0	23.21
18.5	1.37	33.5	6.87	48.5	12.38	63.5	17.89	78.5	23.40
19.0	1.55	34.0	7.06	49.0	12.56	64.0	18.07	79.0	23.58
19.5	1.73	34.5	7.24	49.5	12.75	64.5	18.26	79.5	23.76
20.0	1.92	35.0	7.43	50.0	12.93	65.0	18.44	80.0	23.95
20.5	2.10	35.5	7.61	50.5	13.12	65.5	18.62	80.5	24.13
21.0	2.29	36.0	7.79	51.0	13.30	66.0	18.81	81.0	24.31
21.5	2.47	36.5	7.98	51.5	13.48	66.5	18.99	81.5	24.50
22.0	2.65	37.0	8.16	52.0	13.67	67.0	19.17	82.0	24.68
22.5	2.84	37.5	8.34	52.5	13.85	67.5	19.36	82.5	24.86
23.0	3.02	38.0	8.53	53.0	14.03	68.0	19.54	83.0	25.05
23.5	3.20	38.5	8.71	53.5	14.22	68.5	19.72	83.5	25.23
24.0	3.39	39.0	8.89	54.0	14.40	69.0	19.91	84.0	25.41
24.5	3.57	39.5	9.08	54.5	14.58	69.5	20.09	84.5	25.60
25.0	3.75	40.0	9.26	55.0	14.77	70.0	20.27		
25.5	3.94	40.5	9.44	55.5	14.95	70.5	20.46		
26.0	4.12	41.0	9.63	56.0	15.13	71.0	20.64		
26.5	4.30	41.5	9.81	56.5	15.32	71.5	20.83		
27.0	4.49	42.0	10.00	57.0	15.50	72.0	21.01		
27.5	4.67	42.5	10.18	57.5	15.69	72.5	21.19		
28.0	4.86	43.0	10.36	58.0	15.87	73.0	21.38		
28.5	5.04	43.5	10.55	58.5	16.05	73.5	21.56		
29.0	5.22	44.0	10.73	59.0	16.24	74.0	21.74		
29.5	5.41	44.5	10.91	59.5	16.42	74.5	21.93		

Important information in relation to the use of this table:

The purpose of providing a 2 decimal place table is to allow users to benefit from better resolution of the table data and is not intended to offer a higher accuracy reading

PC based ABV calculator

Accessing the calculator



The PC ABV calculator can be accessed by visiting the Bellingham + Stanley website, clicking on the region selection map and then selecting the option 'Technical'.

Usage notes

General

ABV Calculator

This calculator may be used in place of the existing lookup tables supplied with the Eclipse Alcohol refractometer. Simply input the refractometer and the SG readings and the program will calculate % alcohol by volume to two decimal places!

NOTES:

- The purpose of providing 2 decimal place results is to allow users to benefit from better resolution of the table data and is not intended to offer a higher accuracy reading. The calculation of ABV by way of hand held refractometer and hydrometer is still limited by instrument performance, especially with respect to the temperature and achievable accuracy of the hand held refractometer. As such, the typical accuracy of % ABV vol/vol remains as published at $\pm 0.5\%$.
- Refractometer readings (Zeiss values) must fall between 15 and 130 and specific gravity between must be between 0.9 and 1.1. The results (values) will only be displayed if the input parameters are within these limits and the calculated ABV is in the range 0 to 25.6.

On the move? You can access the above calculators from your mobile phone by visiting www.bellinghamandstanley.com/mobile

IMPORTANT instructions/disclaimer pertaining to the use of web calculators accessed via mobile phone. Please read before using the calculators.

ABV lookup table with two decimal points:
You can download a further lookup table showing the %ABV to two decimal places by [clicking here](#)

S.G. Value	1.008
R (Refractometer Reading in Zeiss)	45
D	8.0
R-D	37.0
ABV	8.16

The purpose of providing a 2 decimal place results is to allow users to benefit from better resolution of the table data and is not intended to offer a higher accuracy reading.

The calculation of ABV by way of a hand held refractometer and hydrometer is still limited by instrument performance, especially with respect to the temperature and achievable accuracy of the hand held refractometer. As such, the typical accuracy of % ABV vol/vol remains as published at $\pm 0.5\%$.

Refractometer readings (Zeiss values) must fall between 15 and 130 and specific gravity must be between 0.9 and 1.1. The results (values) will only be displayed if the input parameters are within these limits and the calculated ABV is in the range 0 to 25.6. Typically, this is limited to beers, wine and ciders although some dry fortified wines and low sugar liqueurs may also be suitable.

Mobile phone ABV calculator

Accessing the calculator



The mobile phone ABV calculator is available from the Bellingham + Stanley mobile website. The Bellingham + Stanley home page has a link to the mobile site or it can be accessed directly by using the URL below.

www.bellinghamandstanley.com/mobile

Usage notes

A screenshot of the mobile phone ABV calculator interface. The interface is blue and white, featuring the Bellingham + Stanley logo at the top left. Below the logo, the text 'Home Page > ABV Calculator' is displayed. The main section is titled 'ABV Calculator' and contains five input fields with corresponding values: 'S.G. Value' (1.008), 'R (Refractometer Reading in Zeiss)' (45), 'D' (8.0), 'R-D' (37.0), and 'ABV' (8.16). A 'Reset between readings' button is located at the bottom of the form.

Not all mobile phones facilitate the use of this calculator.

Not all mobile phones work the same. It is strongly advised that when using any of our calculators via a mobile phone, for the first few times simultaneous results should be made using published tables or the desktop PC calculators to verify correct operation.

Should you envisage using mobile phone calculators on a frequent basis, it is recommended that the pages are 'stored to phone' to allow use in areas where mobile access to the web may be limited. Please refer to your mobile phone manual.

Use of the web calculators will incur a connection/data transmission fee from your provider if a data bundle is not included in your tariff. Contact your service provider for details.

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