

APPENDIX 1

Beer Style Guidelines

ALES

Ales use a top-fermenting *Saccharomyces cerevisiae* yeast strain. They ferment at warmer temperatures and faster than lagers. Ales have a pronounced palate where esters and fruity qualities are part of their makeup.

Style	Original Gravity	Final Gravity	Alcohol by Volume	Bitterness (IBU)*	Color (SRM)**	Body
BARLEY WINES						
English-Style Barley Wine	1.085–1.120	1.024–1.032	8.5–12.2%	50–100	14–22	Very Full
American-Style Barley Wine	1.085–1.120	1.024–1.032	8.5–12.2%	50–100	14–22	Very Full
BELGIAN/FRENCH ALES						
Flanders Brown/Oud Bruin	1.044–1.056	1.008–1.016	4.8–5.2%	15–25	12–18	Light to Medium
Dubbel	1.050–1.070	1.012–1.016	6–7.5%	18–25	10–14	Medium to Full
Tripel	1.060–1.096	1.016–1.024	7–10.1%	20–25	4–6	Medium to Full
Belgian Pale Ale	1.044–1.054	1.008–1.014	4.1–6.2%	20–30	4–12	Light to Medium
Belgian Strong Ale	1.064–1.096	1.012–1.024	7–11%	20–50	4–20	Medium
White (Wit)	1.044–1.050	1.006–1.010	4.8–5.2%	15–25	2–4	Light to Medium
Bière de Garde	1.060–1.080	1.012–1.016	4.5–8%	25–30	8–12	Light to Medium
BELGIAN-STYLE LAMBICS						
Lambic	1.044–1.056	1.000–1.010	5.1–6.4%	11–23	6–13	Light
Gueuze	1.044–1.056	1.000–1.010	5.1–6.4%	11–23	6–13	Light
Fruit Lambic	1.040–1.072	1.008–1.016	5.1–7.0%	15–21	N/A	Light to Medium
MILD AND BROWN ALES						
English Light Mild	1.030–1.038	1.004–1.008	3.4–4.1%	10–24	8–17	Light
English Dark Mild	1.030–1.038	1.004–1.008	3.4–4.1%	10–24	17–34	Light
English Brown	1.040–1.050	1.008–1.014	4.2–6%	15–25	15–22	Medium
American Brown	1.040–1.055	1.010–1.018	4.2–6.0%	25–60	15–22	Medium
Classic English Pale Ale	1.044–1.056	1.008–1.016	4.5–5.4%	20–40	4–11	Medium
India Pale Ale	1.050–1.070	1.012–1.018	5.1–7.6%	40–60	8–14	Medium
AMERICAN-STYLE ALES						
American Pale Ale	1.044–1.056	1.008–1.016	4.5–5.5%	20–40	4–11	Medium
American Amber Ale	1.044–1.056	1.006–1.016	4.5–5.5%	20–40	11–18	Medium
ENGLISH BITTERS						
English Ordinary	1.033–1.038	1.006–1.012	3.1–3.8%	20–35	8–12	Light to Medium
English Special Bitter	1.038–1.045	1.006–1.012	4.2–4.8%	28–46	12–14	Medium

* For an explanation of bitterness, measured in International Bittering Units (abbreviated IBU), see page 3.

** Color is measured by the Standard Research Method (SRM), described on page 6.

ALES (continued)

Style	Original Gravity	Final Gravity	Alcohol by Volume	Bitterness (IBU)*	Color (SRM)	Body
ENGLISH BITTERS (continued)						
English Extra Special Strong Bitter	1.046–1.060	1.010–1.016	4.8–5.9%	30–55	12–14	Medium
SCOTTISH ALES						
Scottish Light Ale	1.030–1.035	1.006–1.012	2.8–3.6%	9–20	8–17	Light
Scottish Heavy Ale	1.035–1.040	1.010–1.014	3.6–4.1%	12–20	10–19	Medium
Scottish Export Ale	1.040–1.050	1.010–1.018	4.1–4.6%	15–25	10–19	Medium
PORTERS						
Brown Porter	1.045–1.060	1.008–1.016	4.5–6.0%	20–30	20–30	Light to Medium
Robust Porter	1.045–1.060	1.008–1.016	5.1–6.6%	25–40	30+	Medium to Full
ENGLISH AND SCOTTISH STRONG ALES						
Old Ale/Strong Ale	1.055–1.075	1.012–1.020	6.1–8.2%	30–40	10–16	Medium to Full
Strong Scotch Ale	1.072–1.085	1.016–1.028	6.8–8.5%	25–35	10–25	Full
STOUTS						
Classic Irish Dry Stout	1.038–1.048	1.008–1.014	4.1–5.4%	30–40	40+	Light to Medium
Foreign-Style Stout	1.052–1.072	1.008–1.020	6.1–7.6%	30–60	40+	Medium to Full
Sweet/Cream Stout	1.045–1.056	1.012–1.020	3.2–6.4%	15–25	40+	Medium to Full
Oatmeal Stout	1.038–1.056	1.008–1.020	3.6–6.1%	20–40	20+	Medium to Full
Imperial Stout	1.075–1.090	1.020–1.030	7.8–9%	50–80	20+	Full

LAGERS

Lagers are produced with bottom-fermenting *Saccharomyces uvarum* strains of yeast at colder fermentation temperatures than ales. This cooler environment inhibits the natural production of esters and other fermentation byproducts, creating a “cleaner-tasting” beer.

Style	Original Gravity	Final Gravity	Alcohol by Volume	Bitterness (IBU)	Color (SRM)	Body
BOCKS						
Traditional Bock German-Style	1.066–1.074	1.018–1.024	6.4–7.6%	20–30	15–30	Medium to Full
Helles/Maibock	1.066–1.068	1.012–1.020	6.4–7.6%	20–30	4–10	Medium to Full
Doppelbock	1.074–1.080	1.020–1.028	6.6–7.9%	17–27	12–30	Full
Eisbock	1.090–1.116	N/A	8.7–14.4%	26–33	18–50	Full
GERMAN DARK LAGERS						
Munich Dunkel	1.052–1.056	1.014–1.018	4.8–5.4%	16–25	17–20	Medium
Schwarzbier	1.044–1.052	1.012–1.016	3.8–5%	22–30	25–30	Medium
GERMAN LIGHT LAGERS						
Munich Helles	1.044–1.050	1.008–1.012	4.8–5.6%	18–25	3–5	Medium
Dortmunder/ European Export	1.048–1.056	1.010–1.014	5.1–6.1%	23–29	3–5	Medium to Full

LAGERS (continued)

Style	Original Gravity	Final Gravity	Alcohol by Volume	Bitterness (IBU)	Color (SRM)	Body
CLASSIC PILSNERS						
German Pilsner	1.044–1.050	1.006–1.012	4.6–5.4%	30–40	3–4	Medium
Bohemian Pilsner	1.044–1.056	1.014–1.020	4.1–5.1%	35–45	3–5	Medium
American Pilsner	1.045–1.060	1.012–1.018	5.0–6.0%	20–40	3–6	Medium
AMERICAN LAGERS						
American Lager	1.040–1.046	1.006–1.010	4.1–4.8%	5–17	2–4	Light
American Light Lager	1.024–1.040	1.002–1.008	3.6–4.5%	8–15	2–4	Light
American Premium Lager	1.046–1.050	1.010–1.014	4.6–5.1%	13–23	2–8	Medium
American Dark Lager	1.040–1.050	1.008–1.012	4.1–5.6%	14–20	10–20	Light
VIENNAS/MÄRZENS/OKTOBERFESTS						
Vienna	1.048–1.056	1.012–1.018	4.8–5.5%	22–28	8–12	Light to Medium
Märzen/Oktobertfest	1.050–1.056	1.012–1.010	5.1–6.0%	18–25	5–15	Medium

HYBRID STYLES (LAGER AND ALE)

Style	Original Gravity	Final Gravity	Alcohol by Volume	Bitterness (IBU)	Color (SRM)	Body
AMERICAN-STYLE HYBRIDS						
American Wheat Ale/Lager	1.030–1.050	1.004–1.018	3.6–4.6%	12–17	2–8	Light to Medium
American Lager/Ale/Cream Ale	1.044–1.056	1.004–1.010	4.3–5.7%	10–22	2–5	Light
GERMAN-STYLE ALES						
Kölsch	1.042–1.046	1.006–1.010	4.8–5.2%	20–30	4–5	Light
Düsseldorf Altbier	1.044–1.048	1.008–1.014	4.6–5.1%	25–48	11–19	Medium
GERMAN WHEAT BEERS						
Berliner Weisse	1.028–1.032	1.004–1.006	2.8–3.4%	3–6	2–4	Very Light
Weizen/Weissbier	1.046–1.056	1.008–1.016	5.0–5.6%	10–15	3–9	Medium to Full
Dunkel Weizen	1.048–1.056	1.008–1.016	4.8–5.5%	10–15	16–23	Medium to Full
Weizenbock	1.066–1.080	1.016–1.028	7.0–9.6%	10–15	5–30	Medium to Full
SMOKED BEERS						
Bamberg Rauchbier Lager	1.048–1.052	1.012–1.016	4.3–4.8%	20–30	10–20	Full
MISCELLANEOUS BEERS						
Fruit and Vegetable Beer	1.030–1.110	1.006–1.030	2.5–12.1%	5–70	5–50	Light to Full
Herb and Spice Beer	1.030–1.110	1.006–1.030	2.5–12.1%	5–70	5–50	Light to Full
California Common (Steam)	1.040–1.055	1.012–1.018	3.6–5%	35–45	8–17	Medium

APPENDIX 2

Hop Chart

Hop	Origin	Use	Alpha Acid % Range	Hop Substitute
B.C. Goldings	Canada, U.S.	flavor, aroma	4–7%	English Kent Goldings
Brambling Cross	U.K., Canada	primarily aroma, occasional bittering	5–7%	English Kent Goldings
Brewers Gold	U.S., U.K., Germany	bittering	6–10 %	Bullion, Northern Brewer
Bullion	U.S., U.K .	bittering	6–11%	Brewers Gold, Northern Brewer, Galena
Cascade	U.S.	bittering, flavor, aroma, dry hop	4–8%	Centennial
Centennial	U.S.	bittering , aroma, dry hop	9–11%	Cascade
Challenger	U.K.	bittering , flavor , aroma	6–9%	Northern Brewer (bittering)
Chinook	U.S.	bittering	11–14%	Brewers Gold, Nugget
Cluster	U.S.	bittering	5–9%	Chinook, Galena
Columbus	U.S.	bittering	12–16%	Eroica
Crystal	U.S.	aroma	2.5–4.5%	German Hallertau Hersbrucker, Hallertauer Mittelfrüh
Czech Saaz	Czechoslovakia	flavor, aroma, dry hop	2.5–5.5%	U.S. Saaz, Lublin
Eroica	U.S.	bittering	9–13%	Brewers Gold
First Gold	U.K.	flavor, aroma	6.5–8.5%	East Kent Goldings
Fuggles	U.K., U.S.	flavor , aroma	3.5–5.5%	Willamette or Kent Goldings
Galena	U.S.	bittering	10–14%	Brewers Gold, Bullion
Hallertau Hersbrucker	Germany	bittering, flavor, aroma	2.3–5%	Hallertauer Mittelfrüh
Hallertau	U.S.	flavor, aroma	3-5-4.5%	German Hallertau Hersbrucker
Hallertauer Mittelfrüh	Germany	bittering, flavor , aroma	3.5–5.5%	Hallertau Hersbrucker
Kent Goldings	U.K.	flavor, finishing, dry hop	4–7%	B.C. Goldings, Fuggles
Liberty	U.S.	aroma	2.5–6 %	Hallertauer Mittelfrüh, Crystal
Lublin	Poland	flavor, aroma	3–6%	Czech Saaz
Mt. Hood	U.S.	flavor , aroma	3–6%	Hallertauer Hersbruck, Mittelfrüh
Northdown	U.K.	bittering, flavor, aroma, dry hop	8–11%	Northern Brewer
Northern Brewer	Germany, U.S., U.K.	bittering, flavor, aroma	7–10%	Northdown
Nugget	U.S.	bittering	10–14%	Chinook

(Hop Chart continued on page 166)

Hop	Origin	Use	Alpha Acid % Range	Hop Substitute
Orion	Germany	bittering	6–7.5%	Northern Brewer
Omega	U.K.	bittering	9–13%	Northdown
Perle	Germany , U.S.	flavor, aroma	6–8%	Hallertauer Mittelfrüh (do not use in Pilsners)
Pride of Ringwood	New Zealand	bittering	8–12%	Galena
Progress	U.K.	flavor, aroma	5–7.5%	Fuggles
Spalt	Germany, U.S.	bittering, flavor, aroma	3–6%	Czech Saaz
Strisselspalt	France	aroma	2.5–4%	Hallertau Hersbrucker
Styrian Goldings	Slovenia	bittering, flavor, aroma	4.5–7.5%	Fuggles
Target	U.K.	bittering	8–10%	Northdown, Yeoman
Tettnanger	Germany, U.S.	bittering,flavor, aroma	3–6.5%	Spalt, Czech Saaz
Ultra	U.S.	aroma	2–4%	Czech Saaz
U.S. Saaz	U.S.	aroma	2–4%	Czech Saaz
Whitbread Golding	U.K.	flavor, aroma	4.5–7.5%	Fuggles
Willamette	U.S.	flavor, aroma	3.5–6%	Fuggles
Yakima Magnum	U.S.	bittering	14–15%	Columbus
Yeoman	U.K.	bittering	6.5–8%	Northdown, Target

APPENDIX 3

Grains and Adjuncts Chart

Grain/ Adjunct	Color (Lovibond)	Gravity (1 lb. in 1 gal.)	Characteristics	Beer Styles
Acid (Sauer) malt	1.3–2.3	1.033	sour taste	Lambics
Amber malt	35	1.032	copper color, biscuit taste	brown ales, mild ales, old ales
Aromatic malt	20	1.036	malt aroma	brown ales
Biscuit malt	25	1.035	baked biscuit flavor and aroma	Belgian
Black barley	500	1.023–1.027	dry, sharp barley flavor	stouts
Black malt / Black patent malt	500	1.026	dry, burnt, chalky character and dark head color	porters, stouts, brown ales, dark lagers
Brown malt	65	1.032	dry biscuit flavor	porters, Belgian ales
Cara-Munich malt	56	1.033	caramel sweetness and aroma, copper color	Belgian ales, German smoked beers, bocks
Cara-Vienne malt	21	1.034	light crystal malt	Belgian Tripels
Cara-wheat	32	1.035	nutty, toasted wheat flavor, improves head retention	dunkel weizen
Chocolate malt	British 475, U.S. 350	1.034	nutty, toasted flavor, brown color	brown ales, porters, stouts, bocks
Crystal or caramel malt	Light: 10–20, Med.: 40–60, Dark: 70–120	1.033–1.035	sweet caramel flavor, mouthfeel, amber color, helps head retention	Light: light lagers and ales, Medium: pale ales, Dark: brown ales, porters, stouts
Dextrin malt	British and American: 1.5, Belgian: 7.8	1.033	adds a fuller body, helps head retention	porters, stouts, and heavier-bodied beers
Dry malt extract (DME)	Extra Light: 2.5, Light: 3.5, Amber: 10, Dark: 30	1.044	Varies with style/brand	All styles
Flaked barley	1.5	1.032	helps head retention, creamy smoothness	porters, stouts
Flaked maize	1	1.037	lightens body and color	light pilsners and ales
Flaked oats	1	1.033	Adds body, smoothness and creamy head	stouts, Belgian ales
Flaked rye	2	1.036	dry, crisp character	rye beers
Flaked wheat	2	1.036	wheat flavor, hazy color, adds body and head retention	wheat and Belgian white beers
Grits	1–1.5	1.037	corn/grain taste	American lagers
Honey malt	25	1.034	nutty, honey, toasted flavor and aroma	brown ales, Belgian wheats, bocks, many other styles

(Grains and Adjuncts Chart continued on page 168)

Grain/ Adjunct	Color (Lovibond)	Gravity (1 lb. in 1 gal.)	Characteristics	Beer Styles
Irish moss	N/A	N/A	prevents chill haze	all lighter colored beers
Kiln-Amber malt	22	1.034	malty, grainy flavor	bocks, Oktoberfests, brown ales, mild ales, Scottish ales
Kiln-Coffee malt	170	1.034	coffee flavor	stouts, porters, brown ales, Scottish ales
Lager malt	1.4	1.038	light color and flavor	lagers
Malto-dextrin	N/A	1.043	adds body and mouthfeel	all extract beers
Maris Otter pale malt	2.2–3	1.038	pale color	pale ales
Melanoiden malt	33	1.033	reddish color	red ales
Mild ale malt	3.2	1.037	dry, nutty, malty flavor	English mild ales
Munich malt	8	1.034	amber color, sweet toasted, flavor and aroma	dark lagers, Oktober- fests, Scottish ales, porters
Oak chips	N/A	N/A	recreates cask-conditioned aroma	IPAs, Belgian ales, Scottish ales
Pale ale malt/Pale 2-row British malt	2.2	1.038	malt flavor	most English and Scottish ales
Pale 2-row American malt	1.8	1.037	moderate malt flavor	most beer styles
Pale 6-row American malt	1.8	1.035	moderate malt flavor	most beer styles
Peat-smoked malt	2.8	1.034	robust smoky flavor	Scottish ales
Pilsner malt	Belgian and German: 1.5, British: 1.75	1.037	light color and flavor	Pilsners and other light-colored beers
Rauch malt	25	1.037	smoky flavor	rauch beers, smoked porters, Scottish ales, barley wines
Roasted barley	500	1.025	dry, roasted flavor, amber color	stouts, porters, Scottish ales
Rye malt	3	1.029	dry, crisp character	rye beers
Special B malt	130–220	1.030	extreme caramel taste and aroma	dark Belgian ales, other dark beers
Syrup malt extract	Light: 3.5, Amber: 10, Dark: 30	1.037	varies with style/brand	all beer styles
Toasted malt	25	1.038	nutty flavor and aroma	IPAs, Scottish ales
Torrified wheat	1	1.036	helps head retention and mouthfeel	pale ales
Scottish ale malt	3	1.038	malt flavor and aroma	Scottish ales

(Grains and Adjuncts Chart continued on page 169)

Grain/ Adjunct	Color (Lovibond)	Gravity (1 lb. in 1 gal.)	Characteristics	Beer Styles
Victory malt	25	1.034	slightly toasted, biscuit flavor and aroma	IPAs, Scottish ales and nut brown ales
Vienna malt	German: 2.5, U.S.:4	German: 1.037, U.S.: 1.035	gold to amber color, toasted, malty, caramel flavor	Vienna, Märzen and Oktoberfest beers
Wheat malt	1.8	German: 1.039, US: 1.038	light flavor, creamy head	all wheat beers, stouts, doppelbocks, and alt

Sugars Chart

Sugar	Color (Lovibond)	Gravity (1 lb. in 1 gal.)	Characteristics	Beer Styles
Brown sugar	Brown: 40, Dark brown: 60	1.046	rich, sweet flavor	Scottish ales, old ales, holiday beers
Candi sugar or rock candi	Clear: 0.5, Amber: 75, Dark: 275	1.036	smooth taste, good head retention, sweet aroma and high gravity without being apparent	Belgian and holiday ales
Corn sugar	1	1.037	priming ingredient	all beer styles
Demerara Sugar	1	1.041–1.042	mellow, sweet flavor	English ales
Dextrose or glucose	1	1.037	mild sweet taste	English beers
Honey	varies with style (clover is .09)	1.032	sweet and dry taste	many beer styles
Invert sugar	N/A	1.046	increases alcohol	Belgian ales
<i>Use as an adjunct or for priming before bottling. It is made from sucrose and is 5–10% less fermentable than sucrose. It does not contain dextrins. Use $\frac{3}{4}$ to 1 cup for priming.</i>				
Lactose	N/A	1.043	adds sweetness and body	sweet or milk stouts
Lyle's golden syrup	zero	1.036	increases alcohol without flavor	Belgian (Chimay) and English beers
Maple syrup	35	1.030	dry, woody flavor	pales ales, porters
Maple sap	3	1.009	crisp, dry, earthy flavor	pale ales, porters
Molasses	80	1.036	strong sweet flavor	stout, porter
Rice solids	.01	1.040	lightens flavor without taste	American and Asian lagers
Sucrose	N/A	1.046	white table sugar increases alcohol	Australian lagers, English bitters
Treacle	100	1.036	intense, sweet flavor	many English ales