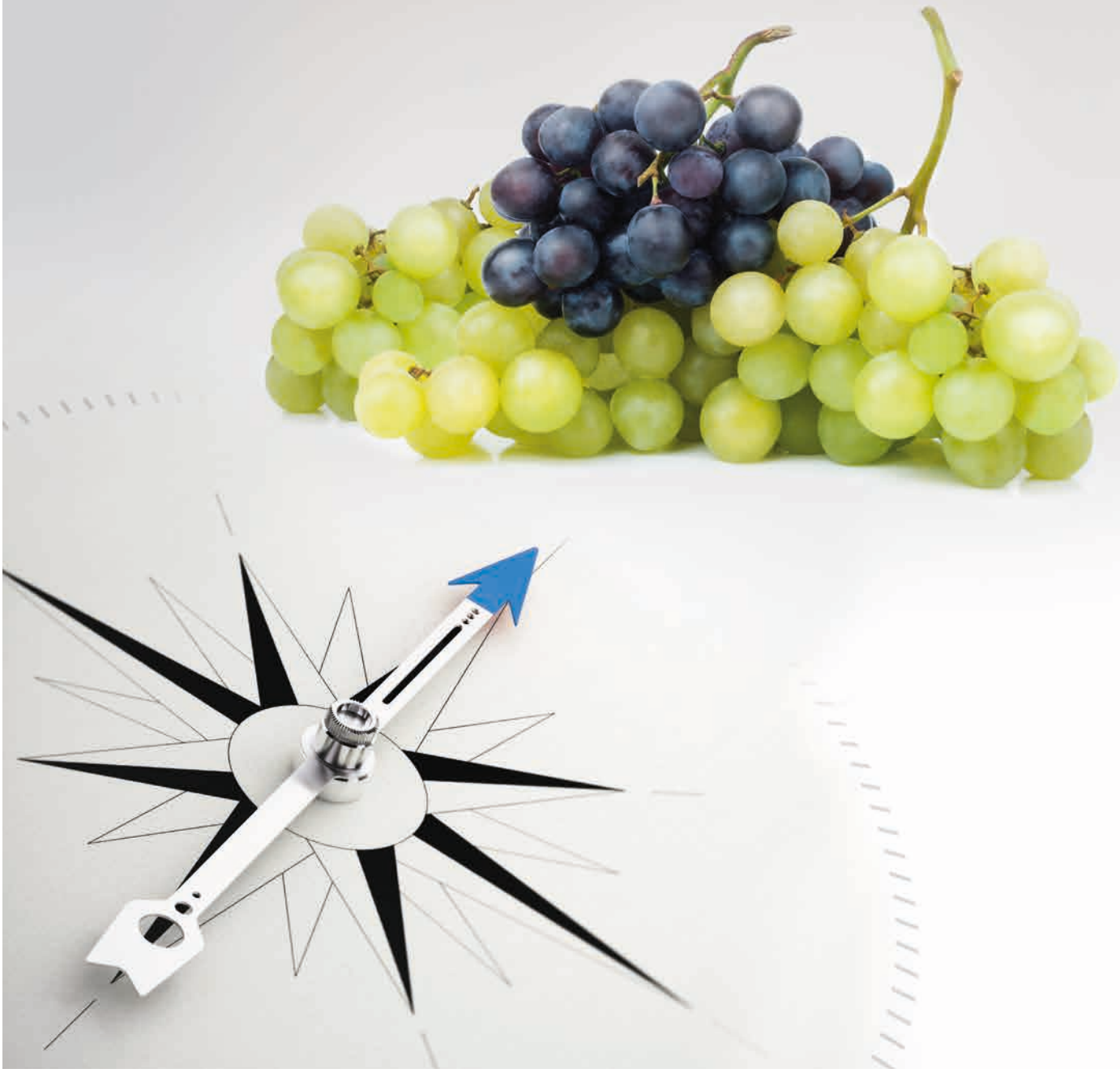
Beverage Treatment Products

Wine Navigator



Powering Business Worldwide

Introduction

Traditional wine making follows age-old, tried-and-tested working methods that have been passed down from generation to generation, but these methods can be limited.

Modern oenology provides a wide range of options for maturing wine and more specifically for maturing it into a high quality product.

However, this also means that greater responsibility and expertise is needed regarding what is possible and what is permitted in order to achieve a high quality result.

There is a wide range of applications for the targeted use of active dry yeasts, yeast nutrients, wine enzymes and malolactic bacteria.

The maturing process includes the new wine after alcoholic fermentation and malolactic fermentation through to bottling.

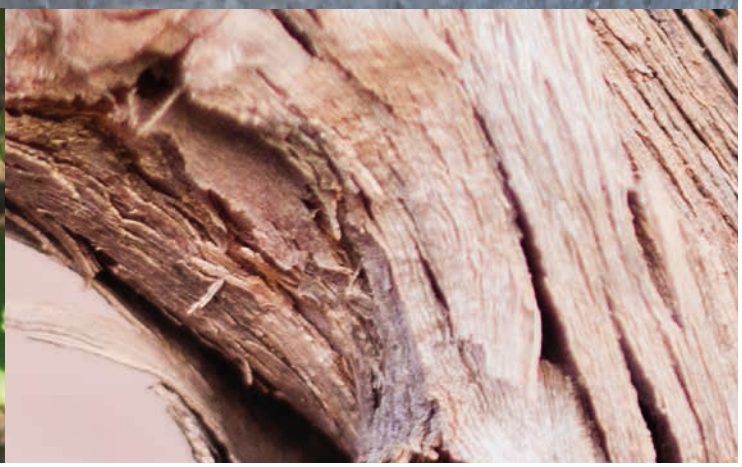
All vinification work during the wine treatment process should make it possible to achieve and ensure the best possible wine quality. The maintenance of this wine quality over a long period of time is an absolute must for modern oenology.

As such, maturing the wine and its subsequent filtration is a fundamental prerequisite for the taste and clarity of a wine.

For storing bottled wine, it is now a fundamental objective that maturing results in a biologically, chemically and physically stable wine. Only excellent quality from the grape to the bottle ensures that the wine can be marketed successfully.

This wine navigator outlines the basic principles from the grape, alcoholic fermentation and malolactic fermentation to bottling. A number of recommendations for individual oenological process steps provide you with a guide to modern oenology.

Contents



Yeasts

White wine yeasts

The modern oenology of white wine making is characterized by the formation of specific aromas from different grape varieties. The characteristics of the region and typicity have a major effect on white wine yeasts. They support the fruity character and aroma of modern wine styles.

Active dry yeasts to produce specific aromas from different grape varieties

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHA® Active Yeast 3 *Saccharomyces Cerevisiae*	Wine region Nahe, Germany	Silvaner, Müller-Thurgau, Pinot Blanc, Pinot Gris, Portugieser, Grüner Veltliner	15–20 g/hl, 40 g/hl in unfavorable conditions	For fruity white and red wines, exclusive character in red wines	Prefers musts with balanced nutrient content, FAN**: ≥ 200 mg/l, fermentation temperature: 15–22°C
SIHA Active Yeast 7 (Riesling Yeast) *Saccharomyces Cerevisiae*	Wine region Palatinate, Germany	Riesling, Müller-Thurgau, Muscat varieties, Gewürztraminer, Sauvignon Blanc, Semillion Blanc	15–20 g/hl, 30 g/hl in unfavorable conditions	Increased ß-glucosidase activity, promotes citrus, tropical fruit, and pineapple aromas	High level of final fermentation, fermentation temperature: 15–20°C
SIHAFERM® Element *Saccharomyces Cerevisiae*	Wine region Palatinate, Germany	Riesling, Pinot Gris, Pinot Blanc, Chardonnay	20–25 g/hl, 30 g/hl in unfavorable conditions	Increased ß-glucosidase activity, helps create specific aromas from different grape varieties, as well as flint and citrus	Moderate fermentation, alcohol tolerance up to 14.5% vol., fermentation temperature: 17–22°C
SIHA CRYAROME® *Saccharomyces Cerevisiae*	Wine region Sauterne, France	Sauvignon Blanc, Riesling, Müller-Thurgau, Silvaner, Muscatel, Welschriesling, new varieties	15–20 g/hl, 20–25 g/hl at ≤ 15°C	"The Sauvignon Blanc yeast", high ß-lyase activity, increased formation of fatty acid esters, excellent cold fermentation characteristics	Preferred temperature 15°C, minimum 13°C, FAN**: ≥ 150 mg/l, fermentation temperature: 13–18°C
SIHA Active Yeast 9 *Saccharomyces Cerevisiae*	Wine region Dalmatia, Croatia	Riesling, Posip, Silvaner, Müller-Thurgau	15–20 g/hl, 20–30 g/hl in unfavorable conditions	Helps create specific aromas from different grape varieties, limited formation of sulfur compounds	Quick fermentation, alcohol tolerance up to 14% vol., fermentation temperature: 16–22°C

Aroma yeasts

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHA VARIOFERM® *Saccharomyces Cerevisiae*	Wine regions Rheingau, Rhenis Hesse, Nahe, Germany	Riesling, Chardonnay, Pinot Blanc, Pinot Gris, Ribolla, Tokaji	15–20 g/hl, max. 30 g/hl in unfavorable conditions	3 *Saccharomyces Cerevisiae* strains, peach and passion fruit aromas, complexity and aroma variety, used for long yeast storage	Rather slow fermentation, prefers high quality musts, important: NTU***: > 70, prefers musts with balanced nutrient content, FAN**: ≥ 220 mg/l fermentation temperature: 15–18°C
SIHA WhiteArome *Saccharomyces Cerevisiae*	Wine region Moselle, Germany	Riesling, Pinot Blanc, Pinot Gris, Gutedel, Muscat varieties, Traminer, Malvasia	15–20 g/hl, 25–30 g/hl in unfavorable conditions	For harmonious white wines with good fruit aromas typical of specific grape varieties	Fermentation temperature: 18–20°C
SIHA Active Yeast 9 s(weet) *Saccharomyces Cerevisiae*	Wine region Dalmatia, Croatia	Welschriesling, Posip, Gewürztraminer, Tokaji, Chardonnay	15–20 g/hl, 20–30 g/hl in unfavorable conditions	Wine with residual sugar, distinctive fruity aroma	Tendency for early fermentation to stop at approx. 20 g/hl; alcohol tolerance up to 12% vol., FAN**: ≥ 150 mg/l, fermentation temperature: 18–22°C

* MLF = Malolactic fermentation, ** FAN = Free assimilable nitrogen, *** NTU = Turbidity unit

	SIHA Speedferm® for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM® Plus (g/hl) max. 40 g/hl	Influence on MLF*
	++	15–20	20–40	++
	+	20–30		- - -
	+	30	20	+
	++	15–25	10	o
	++	20	30	o

	SIHA Speedferm for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM Plus (g/hl) max. 40 g/hl	Influence on MLF*
	++	20	40	++
	+	20–30		+
	+	20–30	20	+

+++ Extremely positive, ++ Very positive, + Positive, o Neutral,
- Negative, - - Very negative, - - - Extremely negative

Champagne, sparkling wine and red wine yeasts

The popular sparkling beverage is produced by bottle or tank fermentation with the help of *Saccharomyces Bayanus* yeast. A continuous pressure build-up and autolysis properties are typical for this yeast category.

Champagne and sparkling wine yeasts

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHA Active Yeast 4 *Saccharomyces Bayanus*	Wine region Champagne, France	Riesling, Pinot Blanc, Chardonnay, Pinot Noir	20–30 g/hl, 40 g/hl in unfavorable conditions	Apple and nut aromas, emphasizes fruity Champagne types, fine mousseux, very pressure tolerant	Very strong fermentation, high temperature tolerance, generates little acetaldehyde, fermentation temperature: 10–18°C
SIHA Active Yeast 5 (Agglocompact) *Saccharomyces Bayanus*	Wine region Alsace, France	Pinot Blanc, Chardonnay, Pinot Noir	20–30 g/hl, 40 g/hl in unfavorable conditions	Agglomerating sparkling wine yeast, sparkling wine and Champagne type	Fermentation temperature, lower limit: 12°C

Red wine yeast

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHA Active Yeast 8 (Burgundy yeast) *Saccharomyces Cerevisiae*	Wine region Baden, Germany	Pinot Noir, Merlot, Pinotage, Pinot Meunier, St. Laurent, Zweigelt	15–20 g/hl, 30 g/hl in unfavorable conditions	Increased glycerin formation, dark fruit aromas such as blackberry, red currant, cherry, classic "Pinot type", low ß-glucosidase activity, killer "positive", increased tannin extraction	Uniform, fast fermentation, tolerates nutrient-poor musts, alcohol tolerance up to 16% vol., FAN**: < 120 mg/l, fermentation temperature: 20–28°C
SIHA Active Yeast 10 (Red Roman) *Saccharomyces Cerevisiae*	Wine region Piedmont, Italy	Dornfelder, Lemberger, Cabernet Sauvignon, Merlot, Cabernet Franc, Sangiovese, Syrah, Shiraz, Zinfandel, Refosco, Amarone, Nebbiolo	15–20 g/hl, max. 30 g/hl in unfavorable conditions	Spicy aromas, dark chocolate, autolysis capabilities, excellent for barrique vinification	Fast fermentation, temperature tolerance up to 32°C, alcohol tolerance up to 16% vol., fermentation temperature: 15–28°C
SIHA Rubino Cru *Saccharomyces Cerevisiae*	Hybrid yeast	Cabernet Sauvignon, Pinot Meunier, rosé wine production	15–20 g/hl, max. 30 g/hl in unfavorable conditions	Mocha and dark chocolate aromas, color stability, killer "positive"	Moderate fermentation, reliable fermentation up to 15.5% vol., fermentation temperature: 18–25°C
SIHAFERM Finesse Red *Saccharomyces Cerevisiae*	Wine region Württemberg, Germany	Pinot Noir, Cabernet Sauvignon, Merlot, Syrah, Zinfandel	15–20 g/hl	High stabilization of color by colorless polyphenols, spicy red wines	High fermentation activity, alcohol tolerance up to 15.5% vol., fermentation temperature up to 30°C
SIHA Terra Rosso *Saccharomyces Cerevisiae*	Wine region Croatia	Teran, Cabernet Sauvignon, Merlot, Zinfandel, Cabernet Meunier	15–20 g/hl, 30 g/hl in unfavorable conditions	High color-stabilizing effect, limited formation of sulfur compounds, significant development of dark berry aromas	Fast fermentation, FAN**: < 130 mg/l, alcohol tolerance up to 16% vol., fermentation temperature: 16–28°C
SIHA MM2 *Saccharomyces Cerevisiae*	Wine region Croatia	Plavac Mali, Pinot Noir, Trollinger, Blauer Portugieser, Syrah	15–20 g/hl, 30–40 g/hl in unfavorable conditions	Limited formation of sulfites and H_2S, killer "positive", distinctive aroma of cherry and red berries	Uniform, fast fermentation, alcohol tolerance up to 16% vol., fermentation temperature: 16–28°C

* MLF = Malolactic fermentation, ** FAN = Free assimilable nitrogen

	SIHA Speedferm for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM Plus (g/hl) max. 40 g/hl	Influence on MLF*
	+	5–10		- - -
	+	15–20		-

	SIHA Speedferm for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM Plus (g/hl) max. 40 g/hl	Influence on MLF*
	+	10		++
	++	10	20	+++
	+		10	++
	+		15–20	+
	+	10	20	++
	+	10	20	++

+++ Extremely positive, ++ Very positive, + Positive, o Neutral,
- Negative, - - Very negative, - - - Extremely negative

Wild and specialty wine yeasts (rosé wine)

The non-saccharomycetes category features selected wild yeast strains for combination with active dry yeasts. The objective is to reflect the aroma of spontaneous fermentation through the combination of non-saccharomycetes and saccharomycetes in wines.

Wild yeasts (non-saccharomycetes)

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHAFERM Nature *Torulaspora Delbrueckii*	Wine region Rheingau, Germany	Riesling, Pinot Gris, Pinot Blanc, Silvaner, Chardonnay	Fermentation: 20 g/hl SIHAFERM Nature, second yeast inoculation: 20 g/hl SIHA Activate Yeast *(Saccharomoyces spp.)* after a 15°Oe decrease	Imitation of spontaneous fermentation, SIHAFERM Nature: low volatile acidity, low alcohol yield, synthesis of fruity ester	Medium fermentation speed of SHIAFERM Nature, high final degree of fermentation after second yeast addition with *Saccharomyces spp.*, fermentation temperature:15–20°C, must: free SO_2: < 10 mg/l

Specialty wine yeasts (rosé wine)

Name	Selection	Particularly suitable for	Dosage	Character/ characteristics	Fermentation
SIHA Active Yeast 8 (Burgundy yeast) *Saccharomyces Cerevisiae*	Wine region Baden, Germany	Pinot Noir, Merlot, Pinotage, Pinot Meunier, St. Laurent, Zweigelt	15–20 g/hl, 30 g/hl in unfavorable conditions	Increased glycerin formation, dark fruit aromas such as blackberry, red currant, cherry, classic "Pinot type", low ß-glucosidase activity, killer "positive", increased tannin extraction	Uniform, fast fermentation, tolerates nutrient-poor musts, alcohol tolerance up to 16% vol., FAN**: < 120 mg/l, fermentation temperature: 20–28°C
SIHA Rubino Cru *Saccharomyces Cerevisiae*	Hybrid yeast	Cabernet Sauvignon, Pinot Meunier, rosé wine production	15–20 g/hl, max. 30 g/hl in unfavorable conditions	Mocha and dark chocolate aromas, color stability, killer "positive"	Moderate fermentation, secure fermentation, alcohol tolerance up to 15.5% vol., fermentation temperature: 18–25°C
SIHA MM2 *Saccharomyces Cerevisiae*	Wine region Croatia	Plavac Mali, Pinot Noir, Trollinger, Blauer Portugieser, Syrah	15–20 g/hl, 30–40 g/hl in unfavorable conditions	Limited formation of sulfites and H_2S, killer "positive", distinctive aroma of cherry and red berries	Uniform, fast fermentation, alcohol tolerance up to 16% vol., fermentation temperature: 16–28°C

* MLF = Malolactic fermentation, ** FAN = Free assimilable nitrogen

	SIHA Speedferm for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM Plus (g/hl) max. 40 g/hl	Influence on MLF*
	+		20	o

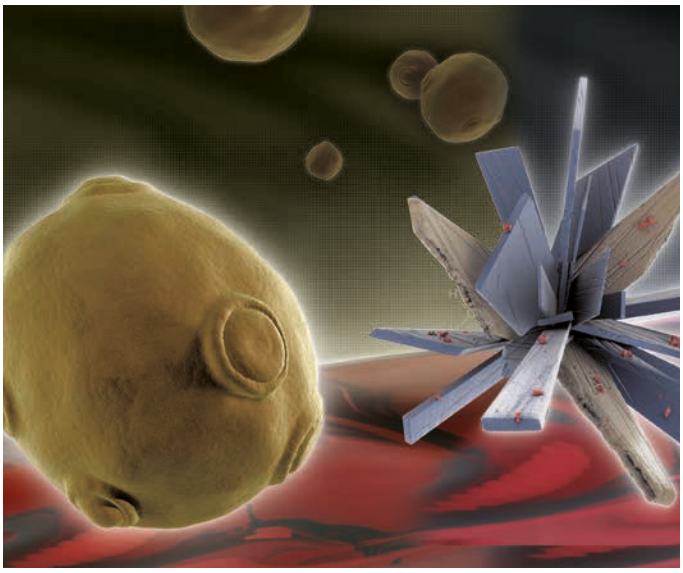
	SIHA Speedferm for rehydration	SIHA Fermentation Salt (g/hl) max. 100 g/hl	SIHA PROFERM Plus (g/hl) max. 40 g/hl	Influence on MLF*
	+	10		++
	+		10	++
	+		20	++

+++ Extremely positive, ++ Very positive, + Positive, o Neutral,
- Negative, -- Very negative, --- Extremely negative

Yeast nutrients

Yeast nutrients and their use

Yeast nutrients are used to support a successful and full alcoholic fermentation without any trouble or delayed fermentation. They feed the yeast cell with inorganic nitrogen (ammonium), organic nitrogen (amino acids), vitamins, minerals, tripeptides, sterols, and lipids in different combinations so that they can quickly and fully ferment the sugar of the grape must into clean and aromatic wine (see Fig. 1). The key parameter for yeast development and vitality is the proportion of nitrogen that can be utilized by the yeast cell (FAN*). FAN is the sum of ammonium and alpha-amino acids minus proline and hydroxyproline.



Yeast cell and yeast nutrient

Application table

Activator for the rehydration of active dry yeasts

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA SpeedFerm	Inactive yeasts	x	x organic	x	x	■				

Complex nutrient with inorganic nitrogen

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA PROFERM H+²	Yeast autolysates, DAHP, vitamin B_1	x	x organic x inorganic	x	x		■	■	■	
SIHA PROFERM Plus	Yeast autolysates, DAHP, vitamin B_1	x	x organic x inorganic	x	x		■	■	■	

* FAN = Free assimilable nitrogen

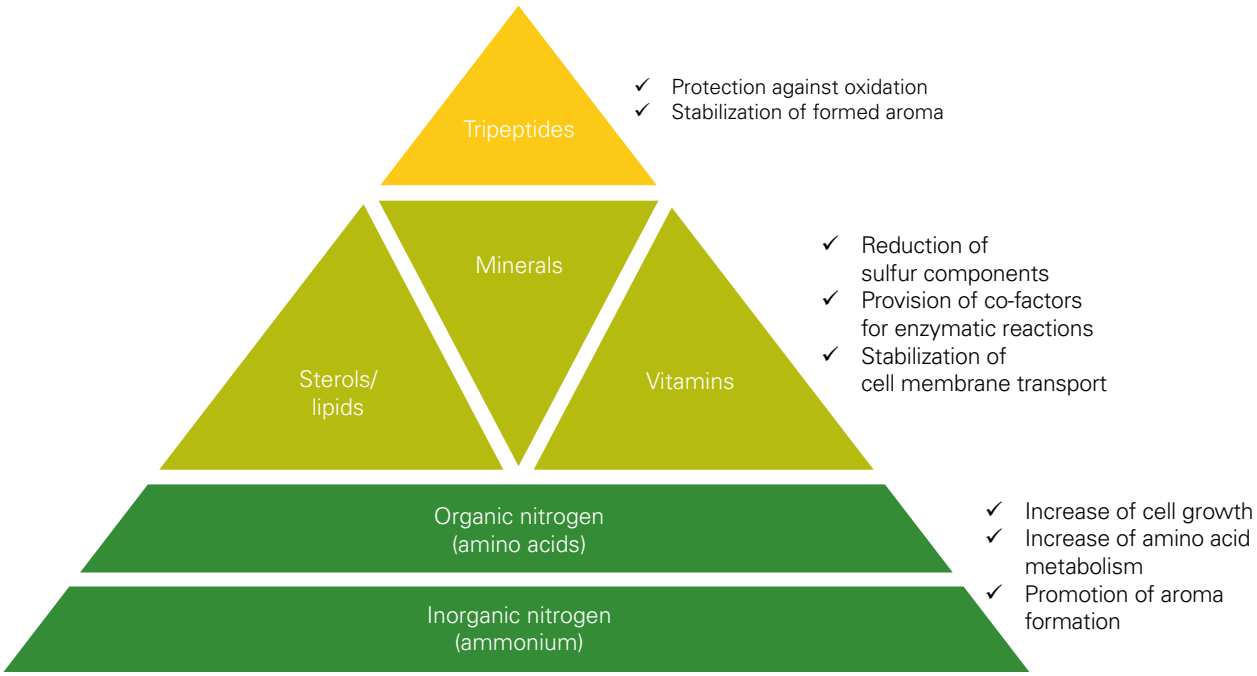


Fig. 1: The nutrition pyramid of the yeast cell and the effect of the individual nutrient on the yeast cell

Effect on alcoholic fermentation/yeast cells	Max. dosage
Improved rehydration, higher active yeast cell count up to the end of alcoholic fermentation, assured final fermentation	40 g/hl

Effect on alcoholic fermentation/yeast cells	Max. dosage
Yeast nutrient for complete yeast nutrition, increased development of the yeast cell count at the beginning of alcoholic fermentation, reduction of off-flavors, assured final fermentation	40 g/hl
Complete nutrition for the yeast cells, assured final fermentation	40 g/hl

x Contains nutrients

Yeast nutrients and their use

Complex nutrient without inorganic nitrogen with high antioxidative capacity for wine making

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA PROFERM Fit	Inactive yeasts	x	x organic	xxxx tripeptides, glutathione	x		■	■	■	■

Complex nutrient without inorganic nitrogen for red wine making

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA PROFERM Red	Yeast autolysates	x	x organic	xxxx amino acids	x		■	■	■	■

Complex nutrient without inorganic nitrogen for specific grape varieties

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA PROFERM Arom+	Yeast autolysate		x organic	x	x		■	■		

Organic certification

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA PROFERM Bio	Yeast cell walls	x	x organic	x	x		■	■	■	■

Inorganic yeast nutrients

Product	Product components	Available nutrients for the yeast cell				Timing of application for alcoholic fermentation				
		Vitamins, minerals	Nitrogen ammonium, organic/ inorganic	Nitrogen amino acids peptides, proteins	Lipids/ sterols	Rehydration	Start	After ⅓	After ½	Abating fermentation
SIHA Fermentation Salt	DAHP		xxxx inorganic				■	■		
SIHA Fermentation Salt Plus	DAHP, vitamin B_1, cellulose	xxxx (vitamin B_1)	xxxx inorganic				■	■		
SIHA Vitamin B_1 (sticks or powder)	Vitamin B_1	xxxx (vitamin B_1)				■	■			

* NTU = Turbidity unit

Effect on alcoholic fermentation/yeast cells	Max. dosage
For the reductive development of white musts and white wine mashes, enriched with tripeptides (glutathione), high antioxidation potential, freshness and longevity of white wines, protection against browning	40 g/hl

Effect on alcoholic fermentation/yeast cells	Max. dosage
Stabilization of red wine color, increased yeast cell count and reliable final fermentation over a wide temperature range, supports the formation of aromas	40 g/hl

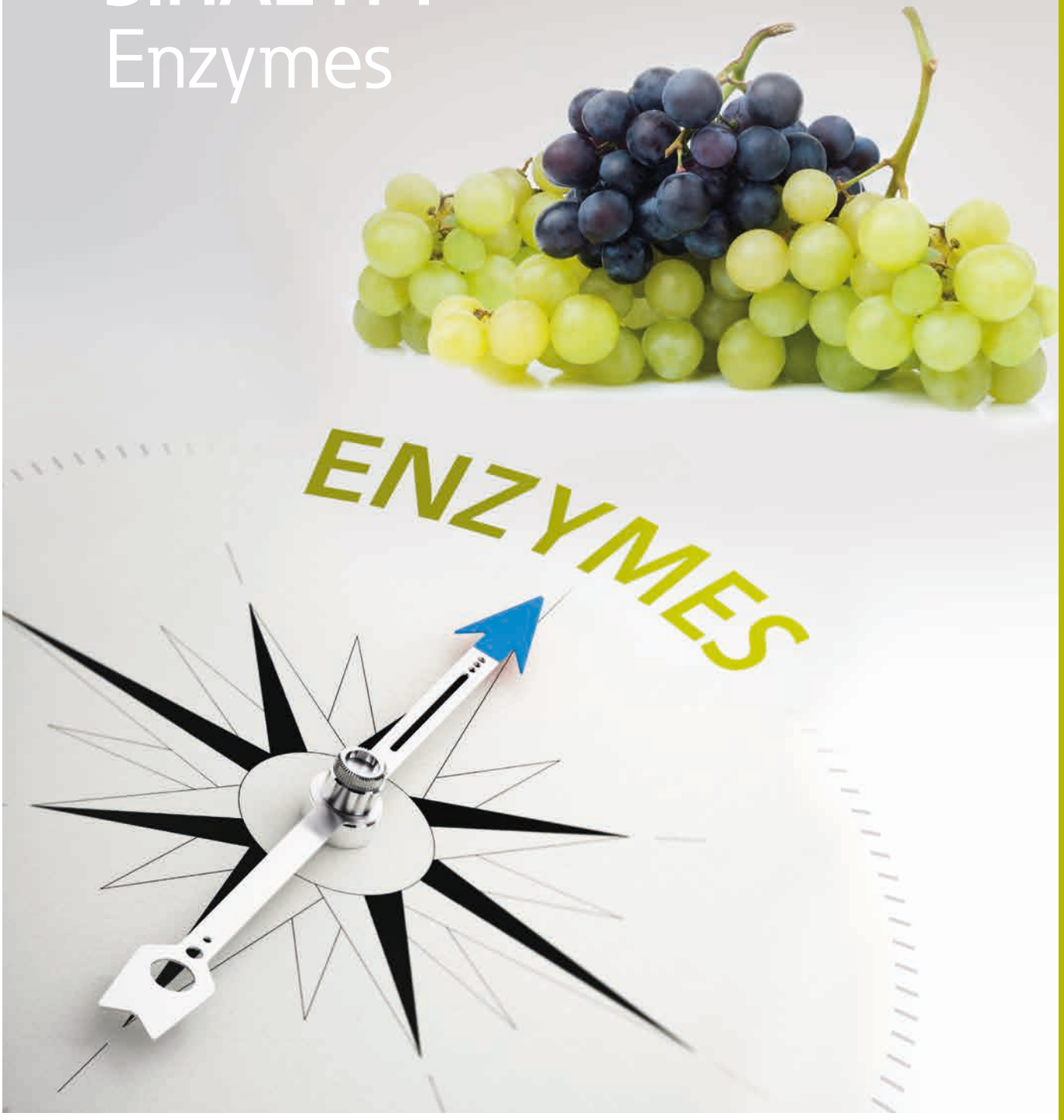
Effect on alcoholic fermentation/yeast cells	Max. dosage
Increase formation of fruity ester, formation of fatty acid esters, increase in formation of 4-MMP and 3-MH	40 g/hl

Effect on alcoholic fermentation/yeast cells	Max. dosage
Certified organic yeast cell wall preparation, high yeast cell count, assured and clean fermentation, selective adsorption of medium-chained fatty acids (fermentation inhibitors)	40 g/hl

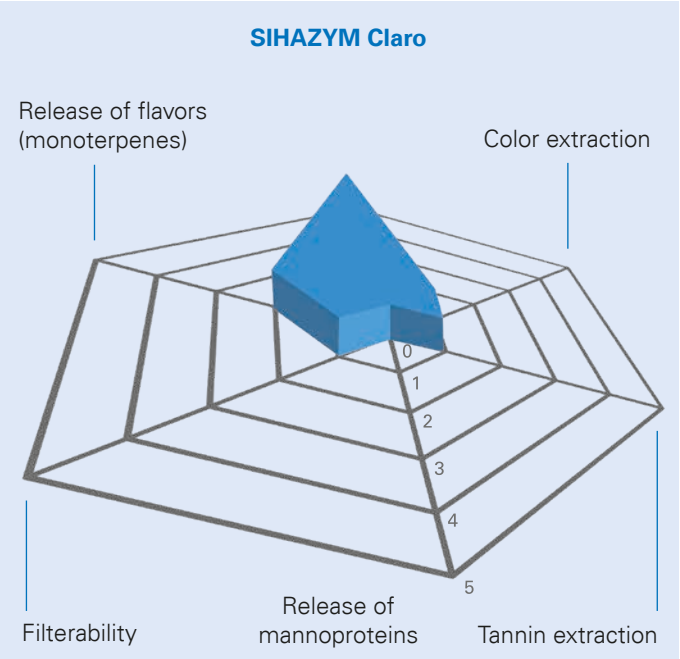
Effect on alcoholic fermentation/yeast cells	Max. dosage
Fast yeast reproduction at the start of alcoholic fermentation	100 g/hl
Fast yeast reproduction particularly for highly pre-clarified musts (NTU* < 10)	50 g/hl
Reduction of the formation of SO_2 bond partners (acetaldehyde, alpha-ketoglutarate and pyruvate), particularly for grapes affected by botrytis	60 mg/hl

x Contains nutrients, xxxx Contains increased nutrients

SIHAZYM®
Enzymes



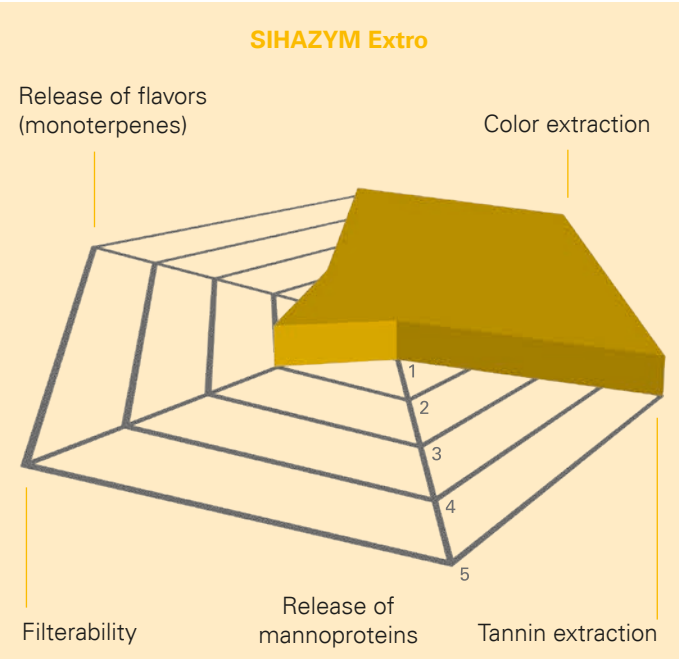
The use of wine enzymes is a simple and gentle process for many steps in production. In addition to must clarification and mash extraction, the uses for wine enzymes include aroma release for white wines and filtration improvement. Wine enzymes are not an industry invention. Naturally occurring wine enzymes provide the basis for the development of effective enzymes in high concentrations.



Must clarification: Natural and gentle with SIHAZYM Claro enzyme

SIHAZYM Claro enzyme is a highly active, pectolytic must clarification enzyme. It enables very fast must clarification with just a low dosage. Use 1–1.5 g/hl at approx. 15°C to obtain pectin-free, clarified must within two to four hours. At must temperatures of approx. 10°C, a dosage of 2 g/hl has the desired effect within two hours. During enzymatic clarification of cold grape musts, SIHAZYM Claro enzyme (4 g/hl at ≥ 5°C) speeds up sedimentation. Since the enzyme is active up to 1,000 mg/l SO_2, common grape/must sulfurization (20–50 mg/l SO_2) is possible

Benefits:
- Fast, gentle and natural must clarification
- Preservation of aroma precursors
- No input of oxidation, reductive work possible
- High clarification level, low NTU* contents
- 60% lower sediment than non-treated musts



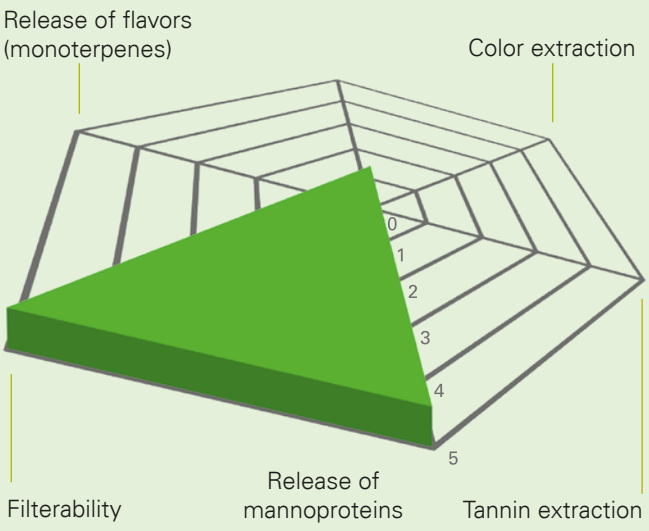
Mash extraction: Increased juice and color yield with SIHAZYM Extro enzyme

SIHAZYM Extro enzyme enhances the natural enzyme activities, resulting in optimal mash extraction. In addition to pectinlyases, it contains pectinesterases and polygalacturonases as an enzyme complex and is therefore ideally adapted to the specific oenological requirements. SIHAZYM Extro enzyme is effective in a wide pH range between 2.9 and 4.0 and large temperature range (10–60°C).

Benefits:
- Highly active enzyme for both white and red mash
- Faster and more effective break down of residual pectins
- Fast reduction of turbidity with low NTU* levels
- Fast must clarification
- Increased proportion of freely draining grape must
- Increased aroma and color extraction

* NTU = Turbidity unit

SIHAZYM Fine/SIHAZYM Wine Clear



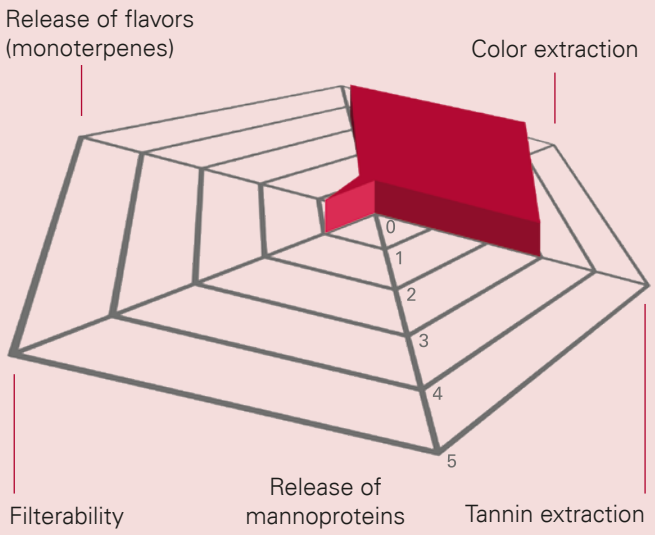
Filtration improvements: Gentle, simple breakdown of filtration-inhibiting substances with SIHAZYM Fine and SIHAZYM Wine Clear enzymes

The only way to break down ß-glucan is to use ß-glucanase, which is contained in SIHAZYM Fine enzyme.

SIHAZYM Wine Clear enzyme can be used in grape mashes and during alcoholic fermentation. It accelerates wine clarification and increases wine filterability due to the combination of pectolytic and ß-glucanase enzyme activities.

Benefits:
- Improves filtration of grapes affected by botrytis
- Simplifies the fining and clarification of wines
- Reliably breaks down pectin and filtration-inhibiting substances

SIHAZYM Uni

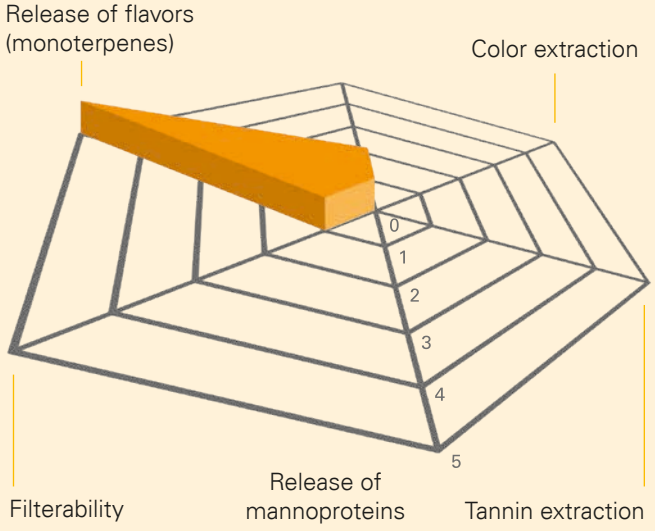


Universal use: Must clarification and mash extraction with SIHAZYM Uni enzyme

SIHAZYM Uni enzyme is a special enzyme combination for must clarification and mash extraction. A dosage of 3 g/hl at approx. 15°C during must clarification results in pectin breakdown and clarification of the grape must within four to ten hours. For mash extraction dosages of 3–4 g/100 kg of mash are required, in order to achieve improved process yield, i.e., more freely draining must.

Benefits:
- Wide range of effects
- Fast must clarification with low NTU* levels
- Increased proportion of freely draining must
- Enhanced extraction of pigments (anthocyanins)

SIHAZYM A



Flavor release: Release of odor-active aromas (monoterpenes) with SIHAZYM A enzyme

SIHAZYM A enzyme is optimized for white wine applications. Since the enzyme is inhibited by must sugar, it cannot release the aroma substances until after the alcoholic fermentation. It should therefore be used at the young wine stage. After the required reaction time, it should be deactivated using a bentonite fining.

Since SIHAZYM A enzyme splits pigments, resulting in decolorization, it should not be used in red wine.

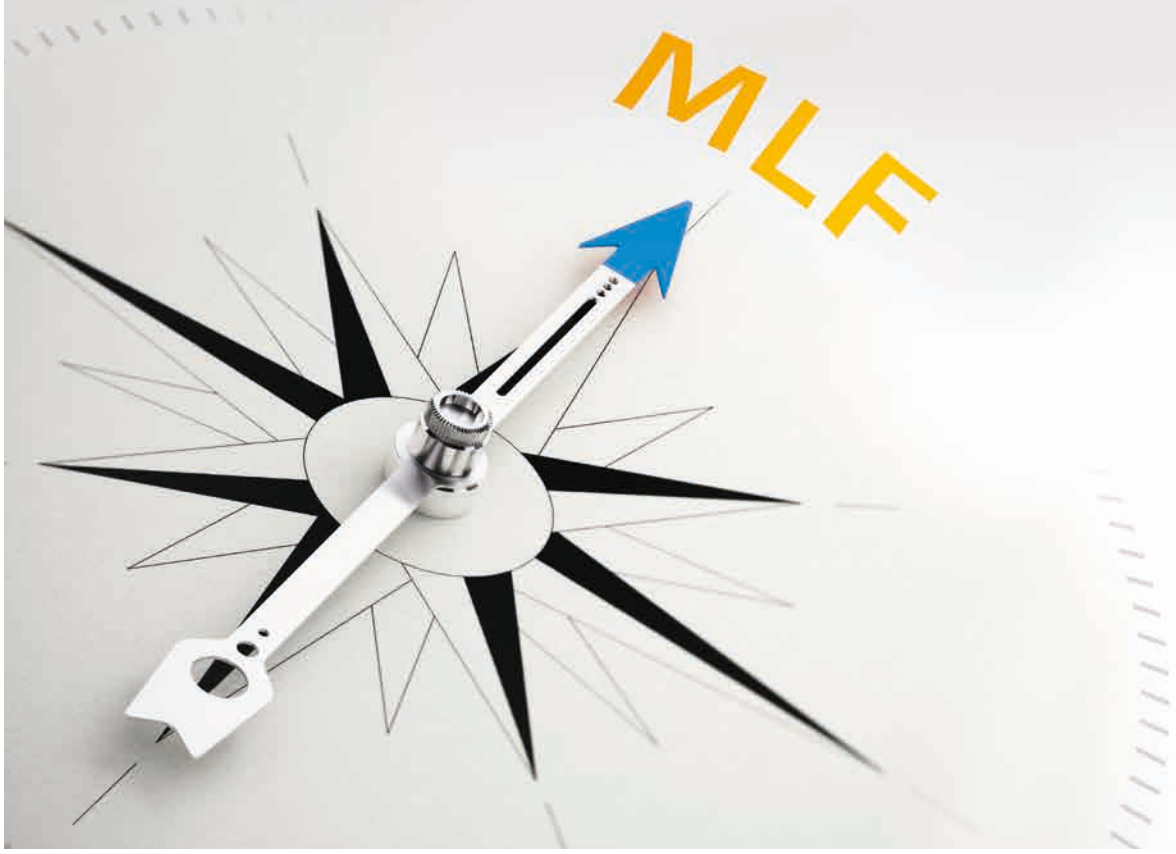
Benefits:
- Releases monoterpenes in white wines
- Increased content of flowery aromas
- High ß-glucosidase activity
- Temperature range > 16°C

Application table

Enzyme	Application – wine production stage	Application in		Temperature
SIHAZYM Claro	Must stage	Clarification tank, flotation, sedimentation	Must clarification: Sedimentation	Approx. 10°C
			Must clarification: Sedimentation	Approx. 15°C
			Flotation	Approx. 15°C
SIHAZYM Extro	Mash stage	Mash transport, mash maceration time, mash fermentation, re-cooled mash (approx. 50°C)	White and red wine mash	8–18°C
			White and red wine mash	18–25°C
			Conventional red wine mash fermentation	15–25°C
			Flash pasteurization	30–40°C
SIHAZYM Fine	Abating fermentation, yeast storage, extraction of mannoproteins	Fermentation tank, young wine storage	Grapes affected by botrytis, fermentation tank	Approx. 16°C
			Abating fermentation	> 16°C
			Yeast storage, mannoproteins	> 16°C
			Difficult to filter young wines	> 16°C
SIHAZYM Wine Clear	Mash stage, abating fermentation	Mash transport, mash maceration time mash fermentation, re-cooled mash (approx. 50°C), alcoholic fermentation	White wine mash	Approx. 15°C
			Re-cooled mash	Approx. 15°C
			Musts difficult to clarify	> 16°C
			Grapes affected by botrytis	Approx. 16°C
SIHAZYM Uni	Must and mash stage	Mash transport, mash maceration time, mash fermentation re-cooled mash (approx. 50°C), clarification tank, flotation, sedimentation	White wine mash	12–15°C
			Conventional red wine mash fermentation	18–20°C
			Re-cooled mash	Approx. 50°C
			Must clarification: Sedimentation	Approx. 15°C
			Difficult to filter young wines	Approx. 16°C
SIHAZYM A	Release of monoterpenes, young wine stage, only for white wines	Storage tank	Young wine with yeast storage	> 16°C
			Young wine without yeast storage	> 16°C

Dosage	Time	Cinnamyl esterase activity	Product formulation	Production process
2 g/hl	2–6 hours	Cleaned, free	Granulate	Combination of solid-phase and submerged process
1–1.5 g/hl	2–4 hours			
2 g/hl	0.5–1 hour			
3 g/100 kg	4 hours to 2 days	Cleaned, free	Granulate	Submerged process
2 g/100 kg	5–20 days			
2–3 g/100 kg	5–20 days			
2 g/100 kg	0.5–6 hours			
3–5 g/hl		Cleaned, free	Granulate	Combination of solid-phase and submerged process
2–3 g/hl	8–14 days			
2–3 g/hl	Up to 21 days			
5–8 g/hl	Up to 8 days			
3–5 g/100 kg	4–6 hours	Cleaned, free	Granulate	Submerged process
3–5 g/100 kg	4–6 hours			
3–4 g/100 kg	4–6 hours			
3–7 g/100 kg				
3–4 g/100 kg	2–4 hours	Cleaned, free	Granulate	Combination of solid-phase and submerged process
3–5 g/100 kg	5–20 days			
2 g/100 kg	2–4 hours			
3 g/hl	4–10 hours			
2 g/hl (+ SIHAZYM Fine 3 g/hl)	2–6 hours			
4–6 g/hl	2–8 weeks	Weak	Granulate	Combination of solid-phase and submerged process
3–5 g/hl	1–2 weeks			

Malolactic fermentation



Malolactic fermentation

In malolactic fermentation (MLF), the focus is on process optimization in addition to the microbiological stability and harmonization of the flavor of the wine. Particular importance is placed on the selection of the appropriate starter culture for the sensory profile of the wine and the inoculation time. The direct addition (direct inoculation) of the malolactic bacteria guarantees a fast start and rapid cell reproduction and forms the foundation for optimal reduction of L-malic acids in L-lactic acids through the formation of secondary aromas that shape the desired wine style.

Inoculation strategies

The inoculation time with malolactic bacteria is an important factor for the formation of secondary aromas that shape the wine style. A distinction is made between inoculation **before** and **after** the addition of active dry yeasts.

If the must is inoculated with malolactic bacteria two to four days before the addition of active dry yeasts, this is known as MLF before alcoholic fermentation (pre-fermative inoculation).

Inoculation two to twelve hours after the addition of active dry yeasts is known as simultaneous inoculation. If the inoculation with malolactic bacteria takes place in abating fermentation (< 10 g/l residual sugar), this is known as conventional inoculation (post-fermative inoculation).

Depending on the inoculation time and the strain of malolactic bacteria, it can support the fruitiness of the wine and affect its typicity (see Fig. 1). The taste impression of the fruitiness is particularly influenced by inoculation in the must (pre-fermative and/or simultaneous) and supported through the malolactic bacteria strains. Inoculation in must requires a fast start and rapid development of MLF.

For wines that are characterized by mature aromas, flavored with a wood character, traditional inoculation (post-fermative) after alcoholic fermentation with freeze-dried malolactic bacteria is recommended.

Application table

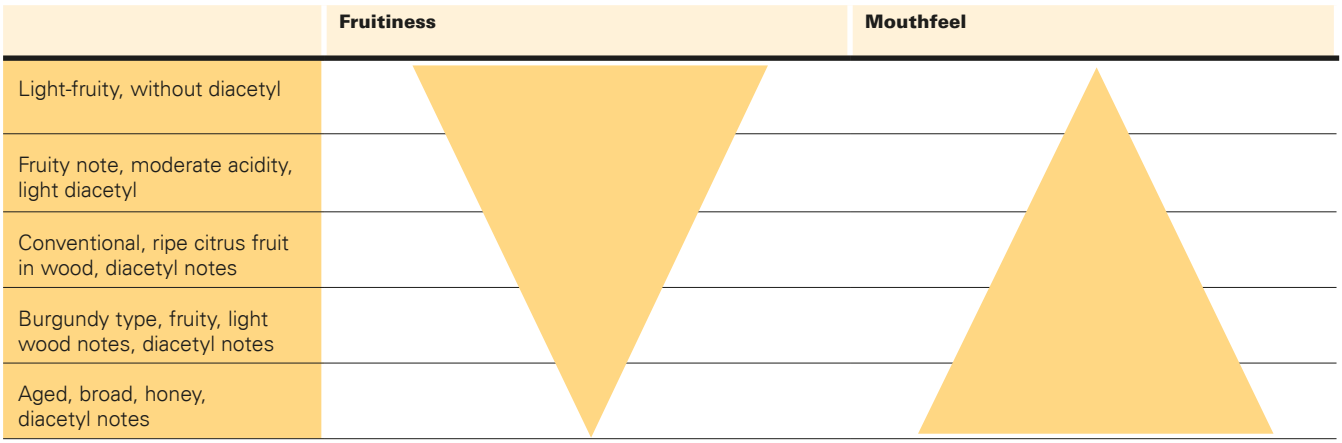


Fig. 1: Connection between fruitiness and mouthfeel

Direct inoculation culture	PH value	Temperature	Free SO_2	Grape variety	Use of citrate	Diacetyl formation
SIHALACT® Oeno	≥ 3.1	≥ 16°C	≤ 25 mg/l at pH 3.1	White wine, rosé wine, red wine	Positive	Low
SIHALACT Mouthfeel	≥ 3.2	≥ 18°C	≤ 25–30 mg/l at pH 3.2	Red wine	Positive	Moderate
SIHALACT Fresh	≥ 3.2	≥ 18°C	≤ 25–30 mg/l at pH 3.2	White wine, rosé wine	Very delayed	None, very low

Production technology for malolactic bacteria and its characteristics

	Freeze-dried malolactic bacteria
Product form	Pellets
Transportation	Cooled
Storage in winery	– 18°C (chest freezer) + 4°C (refrigerator)
Shelf life	36 months

	Freeze-dried malolactic bacteria
Direct inoculation	Yes
Lag phase	24–48 hours
Company size	All

Fining products

Activated bentonite

The selected activated bentonite in the SIHA range is used for effective clarification and protein stabilization in must and wine. In this case, high clarity and adsorption capacity, good suspension properties and low sediment is crucial depending on the application.

Gelatin

SIHA gelatine is a highly purified food gelatin for beverage treatment.
It is ideal for the treatment of grape musts and wines.
It has a high positive charge that intensively reacts and precipitates with negatively charged beverage colloids, e.g., tannins and pectin residues.
Depending on the application in wine treatment, various bloom values are required to ensure optimal sedimentation.

Activated carbons

SIHA activated carbons are highly pure active carbons with plant-based origins with special properties tailored to the requirements of the wine industry. The various activation processes and granulations ensure targeted pore structures in products, so that activated carbons can be used for the respective wine treatment step.

Plant proteins

SIHA pea protein fining agent is a new, vegan treatment agent for the fining and clarification of must and wine. It is a natural plant protein derived from peas. It features outstanding clarification and stabilization properties when used in vegan wine making. The product is GMO and allergen-free according to VO 1169/2011.

Product	Description
SIHA OnLees	Special, inactive yeast preparation for the reduction of astringency and of green and vegetative aromas, improved full body of wines Dosage: 1–15 g/hl End of alcoholic fermentation, during first racking, during wine storage

Product	Description
SIHA Ca-Bentonite G	Calcium bentonite, granulated
SIHA Active Bentonite G	Sodium-calcium bentonite, granulated
SIHA PURANIT™	Highly effective activated bentonite, granulated
SIHA PURANIT UF	Highly effective activated bentonite for ultra-fine filtration

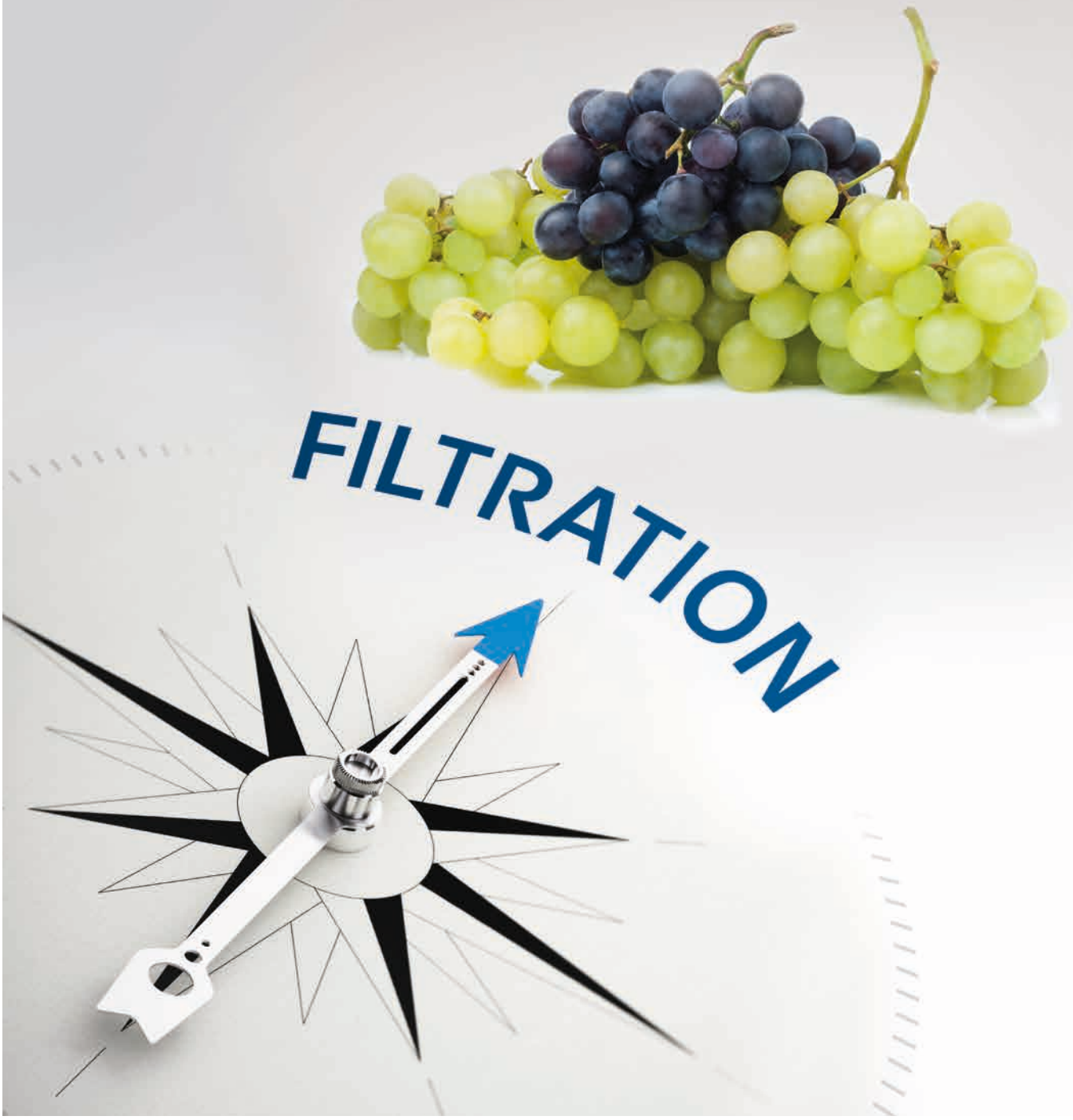
Product	Description
SIHA Gelatine liquid	20% liquid gelatin solution
SIHA Flotation Gelatine	High-bloom gelatin for flotation
SIHA Gelatine fine granules	80–100 bloom gelatin, warm-soluble
SIHA Gesil	Combination product made of gelatin, silicates and polyvinylpolypyrrolidone (PVPP)

Product	Description
SIHA Activated Carbon GE	Activated carbon powder for flavor harmonization
SIHA Activated Carbon FA	Activated carbon powder for discoloration
SIHA Actiliq GE	Low-dust carbon powder for flavor harmonization
SIHA CARBOGRAN FA	Granulated active carbon for discoloration

Product	Description
SIHA Pea Protein	Vegan treatment agent, derived from peas


BECOPAD

Filtration



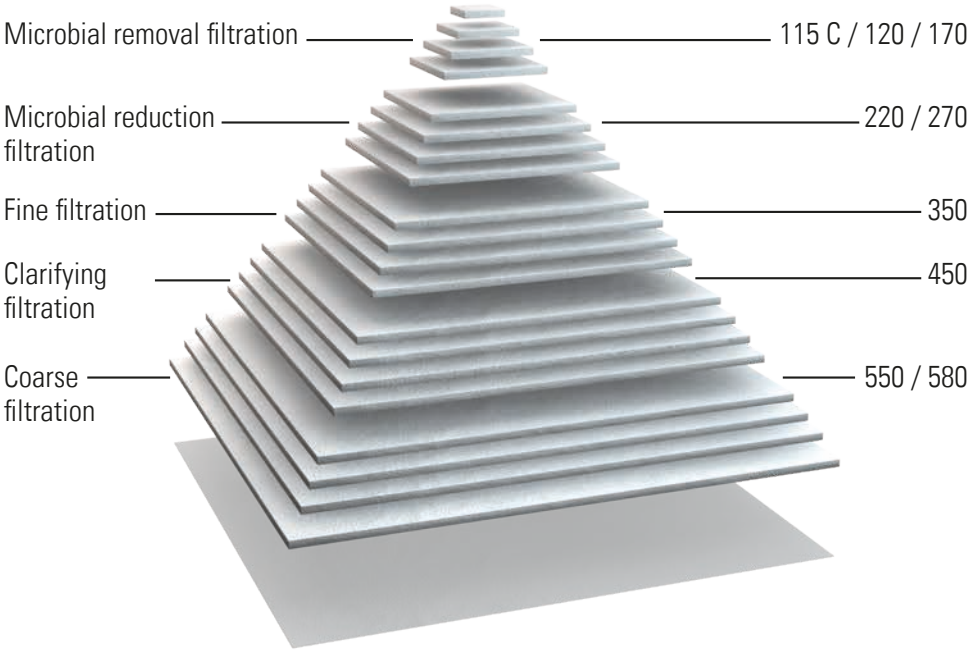
Depth filtration

Depth filtration is used for coarse, clarifying, fine, microbial reduction and removal filtration. It is particularly well suited to effective and reliable retention of colloidal turbidities, ultra-fine particles and micro-organisms.
Depth filter sheets can also be effectively used as a preliminary filter for efficient membrane protection.
Depth filter sheets or support sheets can also be used for the recovery of valuable materials or as a support material for pre-coat filtration.
They are used as a filter medium in BECODISC stacked disc cartridges.
These are also available with the BECODISC R+ range as backflushable variants for coarse, clarifying and fine filtration as well as microbial reduction and removal filtration.

BECOPAD range

For the first time the revolutionary and innovative BECOPAD makes it possible to combine the strictest standards of microbiological safety with the full maintenance of valuable colors and flavors, making this the best thing that could ever happen to your premium wine.

BECOPAD depth filter media are available in nine grades of clarifying sharpness, from coarse to microbial removal filtration.



BECOPAD range		BECODISC range	BECODISC R+- range	Nominal retention range	Water throughput at
Type	Article number	Type	Type	µm	Δp = 100 kPa* l/m²/min
115 C	Q2C11	**B1C3**	**B1C6**	0.1–0.2	26
120	Q2112	**B123**	–	0.1–0.3	54
170	Q2117	**B173**	**B176**	0.2–0.4	77
220	Q2122	**B223**	**B226**	0.3–0.5	100
270	Q2127	**B273**	**B276**	0.5–0.7	135
350	Q2135	**B353**	**B356**	0.7–1.0	160
450	Q2145	**B453**	**B456**	1.0–2.0	300
550	Q2155	**B553**	**B556**	2.0–3.0	570
580	Q2158	**B583**	**B586**	8.0–10.0	3571

These specifications are typical values and are exclusively intended for reference purposes when selecting the depth filter sheet.

* 100 kPa = 1 bar

BECO standard range
Depth filter sheets for standard applications

The broadly diversified standard range includes various depth filter sheets.

Numerous grades cover a broad retention range and enable precise adaptation to the filtration task.

The depth filter sheets in the BECO standard range are suitable for the retentin of particles, colloids and micro-organisms.

BECO standard range		BECODISC BS range	Nominal retention rate	Water through-put at
Type	Article number	Type	µm	Δp = 100 kPa* l/m²/min
Steril S 100	26950	**B01S**	0.1	30
Steril S 80	26800	**B02S**	0.2	46
Steril 60	25600	**B03S**	0.3	60
Steril 40	25400	**B04S**	0.4	69
SD 30	24300	**B05S**	0.5	84
KDS 15	23150	**B06S**	0.6	115
KDS 12	23120	**B08S**	0.8	155
KD 10	22100	**B10S**	1.0	185
KD 7	22070	**B15S**	1.5	225
KD 5	22050	**B20S**	2.0	270
KD 3	22030	**B25S**	2.5	425
K2	21020	**B30S**	3.0	1550
K1	21010	**B40S**	4.0	1900

BECO Steril S

BECO depth filter sheet for demanding, color-protecting filtration of red and white wines. A high germ retetion rate ensures the reliable separation of wine-damaging bacteria and yeasts. This type of sheet is particularly well suited to cold-sterile bottling or the storage of liquids.

The high germ retention rate is archived through the fine-pored structure of the BECO depth filter sheet and an adsorptive, electro kinetic potential.

Type	Article number	Nominal retention rate µm	Water throughput at Δp = 100 kPa* l/m²/min
Steril S	15090	0.1	36

* 100 kPa = 1 bar

BECO depth filter cartridges

BECO PROTECT® depth filter cartridges are made of polypropylene or a special cellulose in a pleated or wrapped design. The depth filter cartridges that cannot be tested for integrity are characterized by high mechanical stability (backflushable) and optimal protection of downstream membrane filter cartridges.

BECO PROTECT FS FineStream
Hour glass geometry

When special polypropylene fleece undergo innovative, special pleating, the result is BECO PROTECT FS FineStream. The wrapping of the filter cartridge matches the shape of an hour glass. This innovative depth filter cartridge enables variable flow and a complete emptying, which is particularly important for high-quality wines. Every drop counts.

BECO PROTECT PP Pure
High-Flow

The high-flow filter cartridge consists of pleated, multi-layer polypropylene filter material and provides a high retention efficiency and large filter surface for high throughput.

BECO PROTECT PG
Funnel geometry

With up to 24 wrapped PP fleece types, graded from coarse to fine, this filter cartridge achieves a depth effect of approx. 10 mm and is therefore particularly suitable for clarification and fine filtration. Due to the funnel geometry, the depth filter cartridge can be backwashed excellently.

BECO PROTECT CS CellStream
BECOPAD inside

The first, innovative depth filter cartridge made of BECOPAD depth filter sheet material. The optimal protection of membrane filter cartridges ensures that the valuable ingredients of the wine are retained.

BECO membrane filter cartridges

BECO membrane filter cartridges are made of single-layer elastic polyethersulfone (PES) membrane material. The special pore structure and membrane geometry of the BECO MEMBRAN PS Wine, PS Pure and PSplus membrane filter cartridges preserve valuable wine ingredients and are tailored to sterile filtration of wine.

BECO MEMBRAN PS Wine
The wine specialist

The valuable flavor and color characteristics of wine and tank fermentations sparkling wines are obtained through the special features of this filter cartridge. The BECO MEMBRAN PS Wine delivers a long service life together with a reliable, high microbiological retention rate.

BECO MEMBRAN PS Pure and PSplus
Two all-rounder

The membrane filter cartridges deliver a high microbiological retention rate and a long service life. The high variability in retention rates and the composition of the membrane filter cartridges provide various application options for sterile filtration in wine.

	BECO PROTECT FS	BECO PROTECT PP Pure	BECO PROTECT PG	BECO PROTECT CS	BECO MEMBRAN PS Wine	BECO MEMBRAN PS Pure	BECO MEMBRAN PSplus
Article numbers	FS002 – FS200	PPPB6 – PPP10	PG002 – PG995	CS115	PSW04, PSW06	PSP02, PSP04, PSP06, PSP10	PES02, PES04, PES06, PES10
Filter material	Polypropylene (PP)	Polypropylene (PP)	Polypropylene (PP)	Special cellulose	Polyethersulfone (PES)	Polyethersulfone (PES)	Polyethersulfone (PES)
Retention rates (µm)	0.2, 0.3, 0.5, 0.6, 0.8, 1, 2, 3, 5, 10, 20	0.6, 1.2, 3, 5, 10	0.2, 0.3, 0.5, 0.6, 0.8, 1, 2, 3, 5, 10, 15, 20, 30, 40, 50, 75, 100, 120, 150	0.2	0.45, 0.65	0.2, 0.45, 0.65, 1	0.2, 0.45, 0.65, 1
LRV value (Titer reduction/cm²)	–	–	–	–	> 7	> 7 1 µm: 6	> 7 1 µm: 6
Retention efficiency	99.98%	99.98%	99.98%	Nominal	Absolute	Absolute	Absolute
Lengths	10", 20", 30", 40"	10", 20", 30", 40"	9.75", 10", 19.5", 20", 29.5", 30", 40"	30", 40"	20", 30"	10", 20", 30", 40"	10", 20", 30", 40"
Adapter codes	F, 0, 2, 7	0, 2, 7	X, F, 0, 2, 7	2, 7	2, 7	0, 2, 7	0, 2, 7
Cages	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pressure hold test Test pressure in bar and diffusion rate per 10"	–	–	–	–	**PSW04** 1.5 bar ≤ 15 ml/min **PSW06** 1.0 bar ≤ 10 ml/min	**PSP02** 2.5 bar ≤ 20 ml/min **PSP04** 1.5 bar ≤ 15 ml/min **PSP06** 1.0 bar ≤ 10 ml/min **PSP10** 0.7 bar ≤ 15 ml/min	**PES02** 2.4 bar ≤ 20 ml/min **PES04** 1.7 bar ≤ 20 ml/min **PES06** 1.0 bar ≤ 20 ml/min **PES10** 0.6 bar ≤ 20 ml/min
Backwashability	Up to 2.0 bar at 80°C	2.0 bar at 20°C	Up to 2.0 bar at 80°C	Up to 2.0 bar at 80°C	Up to 2.0 bar at 20°C	Up to 2.0 bar at 20°C	–
Chemical resistance	pH 1 – 14	pH 1 – 14	pH 1 – 14	Limited	pH 1 – 14	pH 1 – 14	pH 1 – 14
Max. operating temperature	80°C	80°C	80°C	80°C	80°C	80°C	80°C
Max. differential pressure in flow direction	4.8 bar at 25°C 2.0 bar at 80°C	5.0 bar at 20°C 2.0 bar at 80°C	4.8 bar at 25°C 2.0 bar at 80°C	1.5 bar at 20°C	5.0 bar at 20°C 0.3 bar at 121°C	5.0 bar at 20°C 0.3 bar at 121°C	5.0 bar at 25°C 0.3 bar at 121°C
Steam cycles	> 100 at 110°C in 30 minutes	> 100 at 110°C in 30 minutes	> 100 at 110°C in 30 minutes	> 100 at 110°C in 30 minutes	≥ 100 at 105°C in 30 minutes	≥ 100 at 105°C in 30 minutes	≥ 100 at 110°C in 30 minutes

The product range contains a multitude of housings and system solutions for the application of depth and membrane filter cartridges. This includes the BECO INTEGRA® CART cartridge housings made of stainless steel and complex, automatic StepFlow® filtration systems. Filter cartridges from Eaton comply with national and international quality standards such as the German Food and Feed Code (Lebensmittel-, Bedarfsgegenstände und Futtermittelgesetzbuch) and guidelines from the FDA (Food and Drug Administration) from the USA. The plastic components comply with European Directive 10/2011.

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