WINEMAKING

H A N D B O O K

VOLUME XVIII

AEB®

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Wine today: A Structural Reset

The role of AEB

The 2026 Unified Wine & Grape Symposium in Sacramento confirmed what many already feel: **the wine industry is undergoing a structural correction, not a temporary downturn**.

Health, moderation, and intentional consumption are reshaping behavior. The widespread adoption of GLP-1 medications, along with increased use of SSRIs, diabetes medications, and other therapies, is already reducing alcohol consumption both in frequency and volume.

The result is clear: **consumers are drinking less, but they expect wines to be better, lighter, fresher, more stable, and more consistent**.

This shift explains the rise of lower-alcohol, high-acid “bistro” wines, sparkling and fresh styles, **wines designed for immediacy and balance and accessible narratives** that feel relevant, not exclusionary.

Wine is no longer judged only by tradition or critics, but by how well it fits real life.

The “natural wine” movement has played an important historical role and continues to thrive as a niche. But it does not offer scalable answers to today’s challenges.

Modern wine must be clean, expressive, stable, and repeatable.

Consistency is not the enemy of authenticity, it is what allows consumers to **trust a brand.**

Wines today are not crafted the way we *think* people should like them. They are crafted with the tools that allow consumers to like them.

AEB's 2026 portfolio is built around a pragmatic definition of sustainability: using fewer resources to achieve better, more reliable results.

From formulation to process, our solutions are designed to **reduce inputs, energy consumption, and waste while improving wine quality and consistency**. Products such as tannins, polysaccharides, inactivated and non-*Saccharomyces* yeasts, enzymes, and functional nutrients play a central role in naturally protecting wines against oxidation and instability. They allow winemakers to **minimize SO_2 additions**, **extend shelf life without sacrificing freshness, and improve mouthfeel, aromatic precision, and overall balance**. The result is less reprocessing, fewer corrective interventions, and reduced product loss, **wines that last longer and perform better throughout their commercial life**.

Sustainability, however, is not only a matter of formulation. It is also a matter of **process efficiency**. Our equipment line features machines like the **E-FLOT**, which enables **rapid clarification** with significantly lower energy demand compared to extended cold settling, centrifugation, or prolonged refrigeration. Faster clarification means shorter processing times, reduced tank occupation, and lower cooling requirements across the cellar, delivering both qualitative and environmental benefits.

Similarly, **STABYMATIC** ion exchange provides precise **tartrate and metal stabilization** without the need for long cold stabilization cycles. By dramatically reducing refrigeration time, energy consumption, and wine losses, it offers a targeted, efficient alternative that preserves wine integrity while improving overall process sustainability.

Yeast management is another critical lever. With **REACTIVATEUR** and **PROPAGATOR**, yeast can be recovered, reactivated, and reused, reducing raw material consumption and waste while ensuring healthier, more **controlled fermentations**. This approach lowers the risk of sluggish or stuck fermentations and decreases the need for emergency interventions, saving time, product, and resources.

Taken together, these solutions are not optional accessories. They are core tools for modern, sustainable wineries, where quality, consistency, energy efficiency, and resource optimization must coexist. Sustainability, in this context, is not an abstract concept, it is the practical outcome of **smarter choices at every stage of the winemaking process**.

The future belongs to wineries that embrace science, efficiency, and realism, crafting wines that are stable, enjoyable, and aligned with how people live today.

AEB's mission in 2026 is to support that future, by providing the tools that make wines consistent, resilient, and genuinely sustainable, from fermentation to the glass.

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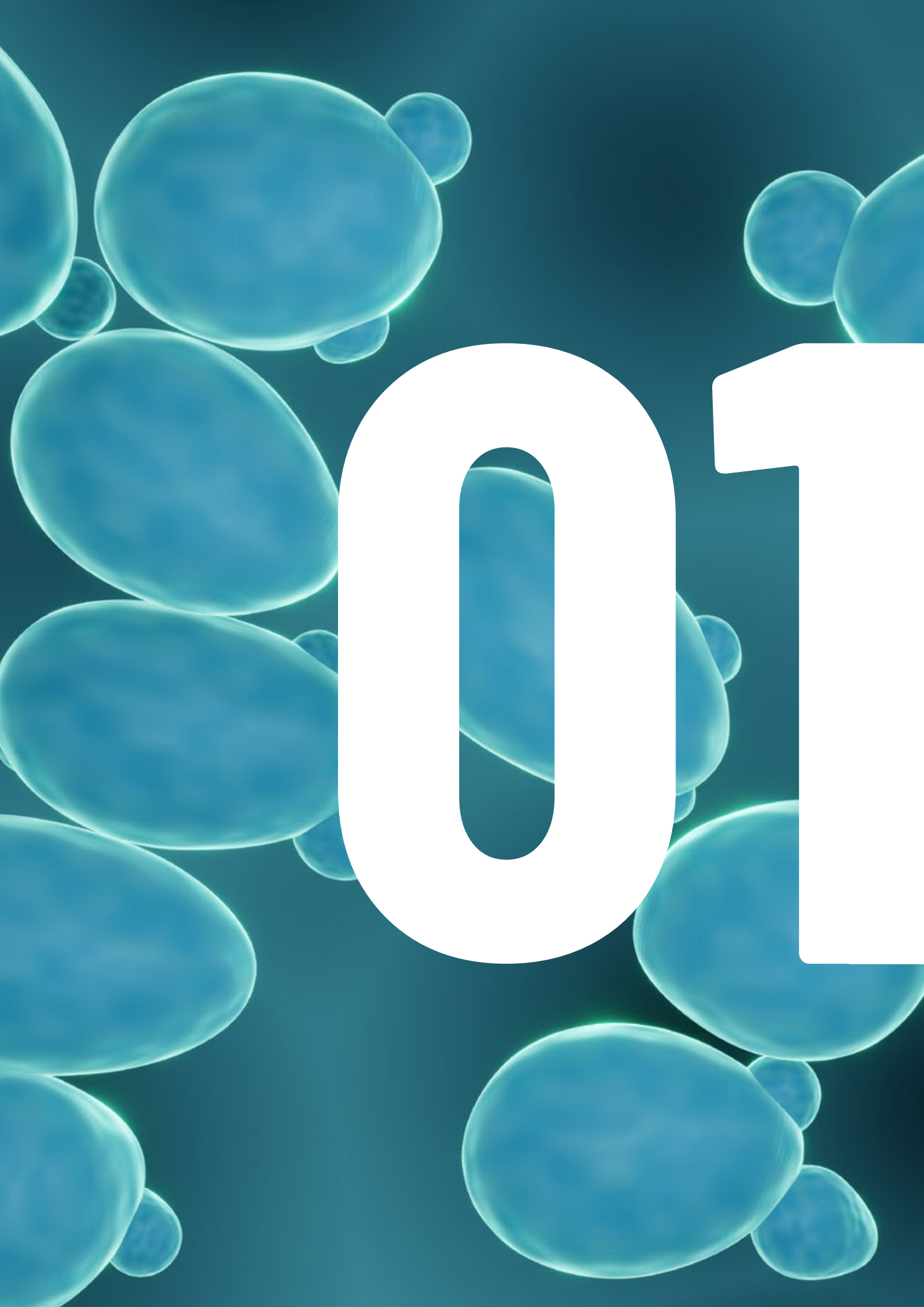
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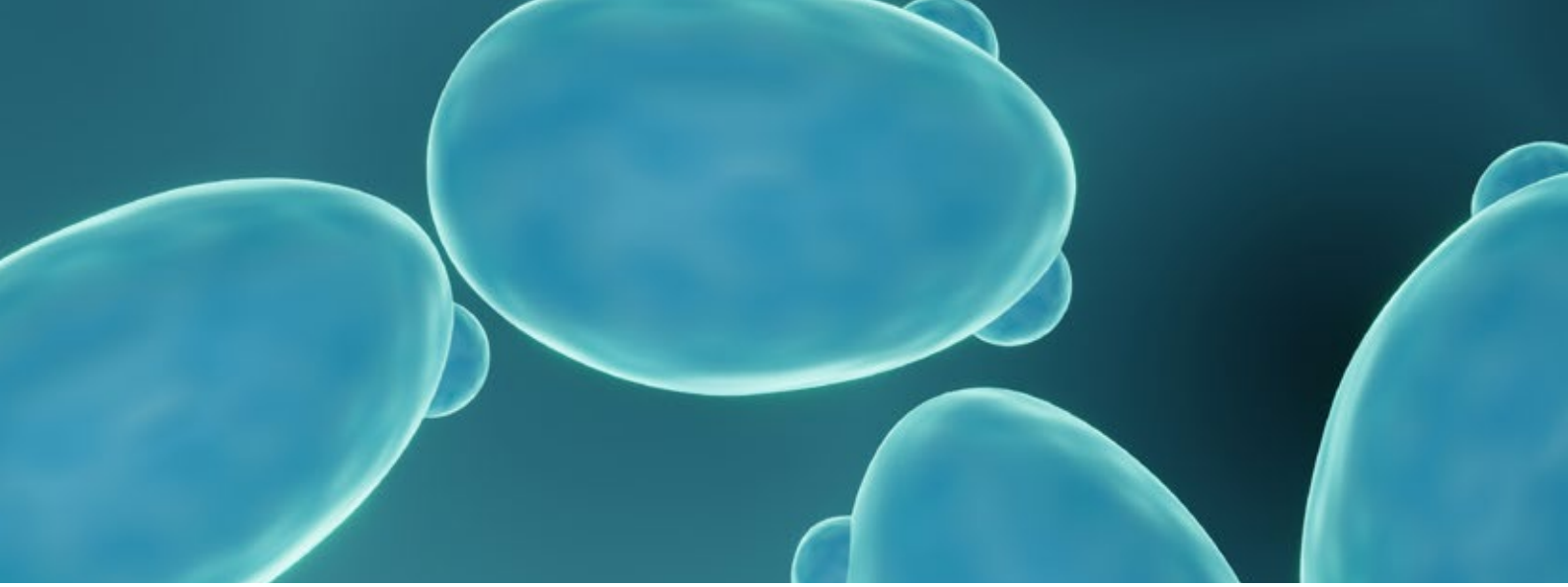

Yeasts

Introduction

AEB's yeast portfolio is designed to give winemakers both **fermentation security and advanced control over wine style**. The range includes a **complete selection of *Saccharomyces cerevisiae* and *bayanus* strains**, covering aromatic whites, thiol expression, cold fermentations, structured reds, sparkling wines, and reliable restart solutions. Alongside this, AEB offers an advanced **non-*Saccharomyces* (NS) line and ready-to-use *Sacch*+ non-*Sacch* (SNS) blends**, developed to meet modern stylistic and technical goals. Non-*Saccharomyces* yeasts contribute greater aromatic complexity, improved mouthfeel, and fresher profiles, while typically delivering lower alcohol levels, increased natural acidity, and a significant reduction in volatile acidity (often 30–40% lower compared to conventional *Saccharomyces* fermentations). SNS formulations combine non-*Saccharomyces* and *Saccharomyces* in a single inoculum, eliminating the need for sequential additions and simplifying cellar operations while maintaining fermentation reliability. The portfolio is completed by **PRIMAFLORA**, a bioprotection culture applied at harvest to control spoilage microflora, limit oxidation, and reduce or replace early SO_2 additions, helping preserve freshness and aromatic potential from the very first stages of processing.

LEGEND

- Yeast for sparkling wines and restart
- Yeast for white wines
- Yeast for rosé and light red wines
- Yeast for structured and ageing red wines
- Non-*Sacch* and *Sacch*/non-*Sacch* yeast blend or Polivalent yeast

YEAST STRAIN	SUGGESTED VARIETIES / USE	AROMATIC PROFILE	NITROGEN DEMAND (YAN)	ALCOHOL TOLERANCE	FERMENTATION TEMPERATURE
FERMOL Arôme Plus (*S. cerevisiae*)	Pinot Grigio, Moscato, aromatic whites	Intense floral and terpene lift	High (at least 200 mg/L recommended)	High (≈14–15% v/v)	Low temp capable (≈12–18 °C)
FERMOL Blanc (*S. cerevisiae r.f. bayanus*)	Neutral & aromatic whites, cider, mead	Floral, citrus, white pulp fruit	Low	High	Cool fermentations
FERMOL Candy (Hybrid *S. cerevisiae*)	Whites, rosé, young reds	Amylic, candy-like esters, yellow fruit	Moderate	Good	≥12 °C
FERMOL Chardonnay (*S. cerevisiae*)	Chardonnay, lees-aged whites	Ripe & exotic fruit, sur lie roundness	Moderate	Good	Low temp & barrel capable
FERMOL Fleur (*S. cerevisiae*)	Grüner Veltliner, aromatic whites, rosé	White flowers, balsamic, menthol	Moderate	Good	Cool–moderate
FERMOL Lime (*S. cerevisiae*)	Sauvignon Blanc, cool-climate whites	Grapefruit, lime, citrus-herbal	Responds to AA nutrition	Good	Cool whites
FERMOL Sauvignon (IRC7+)	Sauvignon, Viognier, thiol-rich whites	Thiols: citrus, blackcurrant, exotic	Moderate	Good	Cool–moderate
FERMOL Tropical (Hybrid)	Sauvignon, Chardonnay, Viognier	Tropical fruit, sage, thiol complexity	Benefits from thiol nutrition	Good	Cool–moderate

YEAST STRAIN	SUGGESTED VARIETIES / USE	AROMATIC PROFILE	NITROGEN DEMAND (YAN)	ALCOHOL TOLERANCE	FERMENTATION TEMPERATURE
FERMOL PB2033 (*S. cerevisiae*)	Rosé, fresh young reds	Red currant, cherry, strawberry	Moderate	Good	12–34 °C
FERMOL Red Bouquet (*S. cerevisiae*)	Fruit-forward reds & rosé	Blackcurrant, plum, violet	Low	Good	Moderate
FERMOL Cryofruit (Hybrid *S. cerevisiae* × *S. uvarum*)	Gamay, Riesling, aromatic reds	Thiolic lift, floral, fresh berries	Moderate	Good	Very cold capable
FERMOL Grand Rouge (*S. cerevisiae*)	Structured, concentrated reds	Clean varietal, tannic structure	Very low	High	Warm / high temp
FERMOL Mediterranée (*S. cerevisiae*)	Warm-climate aging reds	Fig jam, cherry, polysaccharide roundness	Low	Good	Moderate
FERMOL Premier Cru (*S. cerevisiae*)	Premium age-worthy reds	Complex aromatics, full body	Moderate	High	Moderate
FERMOL Red Fruit (Hybrid)	Young fruity reds	Blueberry, blackcurrant, raspberry	Low–moderate	Good	Moderate
FERMOL Rouge (*S. cerevisiae*)	Young & mid-term reds	Intense red berries, color enhancement	Low	High	Warm capable
FERMOL Super 16 (*S. cerevisiae*)	High-sugar musts, passito	Clean fruit, long finish	Moderate	Very high	High temp
LEVULIA T.P.CO (Hybrid)	Shiraz, Bordeaux blends	Floral + black fruit	Low	Up to ~16.5%	18–25 °C
FERMOL Perle (Hybrid *S. cerevisiae* × *S. uvarum*)	Sparkling, refermentation	Neutral, balanced	Low–moderate	High under pressure	Cold refermentation
PRIMAFLORA VB (Biocontrol)	Pre-ferment protection (all colors)	Cleaner aromatics, less oxidation	Not applicable	Not applicable	Pre-ferment use
LEVULIA Probios (Organic *S. cerevisiae*)	Organic wines, sparkling base	Clean, varietal respectful	Low–moderate	High	Wide range
LEVULIA Cristal (*S. bayanus*)	Traditional & tank sparkling	Neutral, preserves base wine	Low–moderate	High pressure	Cold–moderate
FERMOL Charmat (*S. cerevisiae*)	Charmat, cider, seltzer, restart	White fruit, citrus esters	Low	High	Cryophilic
FERMOL Complet Killer Fru (Fructophilic *bayanus*)	Restart stuck fermentations	Neutral	Designed for restart	High	Cold & stress

YEAST STRAIN	SUGGESTED VARIETIES / USE	AROMATIC PROFILE	NITROGEN DEMAND (YAN)	ALCOHOL TOLERANCE	FERMENTATION TEMPERATURE
SNS FERM Fruit (*L. thermotolerans + S. cerevisiae*)	Fresh reds, rosé, whites	Juicy fruit, volume	Moderate	≈14.5%	22–26 °C
SNS FERM Le Fleur (*Torulaspora + Lachancea + S. cerevisiae*)	Floral whites, rosé	Floral & citrus, higher acidity	Moderate	≈13.5%	22–26 °C
LEVULIA Alcomeno (*L. thermotolerans*)	Alcohol reduction programs	Freshness, acid lift	Sequential use	≈7% alone	Early moderate
LEVULIA Torula (*Torulaspora delbrueckii*)	Aromatic whites, rosé	Tropical lift, roundness	Low–moderate	≈9% alone	Cool–moderate
NS FERM Alcomeno (*Lachancea thermotolerans*)	Lactic acid production	Fresh style, lower alcol	Low–moderate	Sequential	48 h before S.c.
NS FERM Tiotoru (*Torulaspora delbrueckii*)	Thiol whites & elegant reds	Tropical thiols, soft phenolics	Low–moderate	Sequential	48 h before S.c.
SNS FERM Thiol (*T. delbrueckii + S. cerevisiae*)	Aromatic whites, complex rosé	Major thiol expression	Moderate	Good	Direct inoculation
NS FERM Bellissima (*M. pulcherrima*)	Co-fermentation programs	Sweet fruit, texture lift	Not applicable	Not applicable	Preferment
ZYMASIL Pronto Blanc (Direct inoculation)	Whites, pale rosé	Floral, white fruit esters	Integrated nutrient	≈15.5%	Cool–moderate
ZYMASIL Pronto Rouge (Direct inoculation)	Reds, large tanks	Ripe red fruit	Integrated nutrient	≈15.5%	Moderate–warm

White & floral expression yeasts

FERMOL Arôme Plus

STRAIN / SPECIES	*Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	Short lag-phase, good ethanol and SO_2 tolerance, capable of fermenting at low temperatures (~12 °C / 53 °F). Requires good (200 ppm) YAN. Killer-neutral, POF-negative.
AROMATIC & SENSORY CONTRIBUTION	Produces wines with very intense aromas where primary varietal notes harmonize with fermentation-derived floral and terpene expression.
RECOMMENDED VARIETIES	Pinot Grigio, Moscato; performs particularly well in co-fermentation with FERMOL Chardonnay.
RED WINES	Limited use, only for light, aromatic styles.
WHITE WINES	Recommended for modern, round aromatic whites and cold fermentations.
ROSÉ WINES	Recommended for aromatic rosé at cool temperatures.
ALL-PURPOSE	Best suited where aromatic intensity and terpene enhancement are desired.

FERMOL Blanc

STRAIN / SPECIES	*Saccharomyces cerevisiae* r.f. *bayanus*
FERMENTATION PROFILE / KEY TRAITS	Low nitrogen demand, excellent performance at low temperatures, very low H_2S production except under extreme deficiency; resistant to cold and high alcohol. Suitable for lees maturation and non-grape fermentations (cider, fruit wine, mead, agave). Killer-neutral.
AROMATIC & SENSORY CONTRIBUTION	Full-bodied wines with complex aromas: flowers, citrus, white-pulp fruit.
RECOMMENDED VARIETIES	General aromatic and neutral whites; also cider and mead.
RED WINES	Occasional use for light reds requiring clean fermentations.
WHITE WINES	Ideal for cool fermentations and lees aging.
ROSÉ WINES	Good for fresh, low-temp rosé fermentations.
ALL-PURPOSE	Robust, low-maintenance fermentation strain.

FERMOL Candy

STRAIN / SPECIES	Hybrid *Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	Multiplies rapidly and implants strongly, including in musts that have undergone pre-fermentative cold processing. Performs best at fermentation temperatures above 12 °C - 53 °F.
AROMATIC & SENSORY CONTRIBUTION	Enhances amylic & candy-like aromas, yellow fruits, and fermentation esters.
RECOMMENDED VARIETIES	White, rosé, and young red wines.
RED WINES	Recommended for young aromatic reds.
WHITE WINES	Develops expressive fermentative esters.
ROSÉ WINES	Well suited for modern amylic rosé styles.
ALL-PURPOSE	Useful in musts with undesired native microflora.

FERMOL Chardonnay

STRAIN / SPECIES	*Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	Produces fine lees rich in mannoproteins, rapidly releasing polysaccharides and increasing viscosity and mid-palate roundness. Killer-neutral. Very versatile both for barrel fermentation and low-temperature fermentations.
AROMATIC & SENSORY CONTRIBUTION	Ripe and exotic fruits, smooth full mouthfeel, strong sur-lie performance.
RECOMMENDED VARIETIES	Chardonnay and whites matured on lees.
WHITE WINES	Best suited for barrel or sur-lie aged whites.
ROSÉ WINES	Occasional use for round, textured rosé.
ALL-PURPOSE	Preferred when mouthfeel and polysaccharide release are primary goals.

White & aromatic expression yeasts

FERMOL Fleur

STRAIN / SPECIES	*Saccharomyces cerevisiae* — IFV Nantes selection
FERMENTATION PROFILE / KEY TRAITS	Enhances floral ester production; low malic acid consumption, helping preserve freshness in warm-climate musts.
AROMATIC & SENSORY CONTRIBUTION	White-flower bouquet with balsamic and menthol nuances, persistent both on nose and palate.
RECOMMENDED VARIETIES	Grüner Veltliner, aromatic whites, modern rosé wines.
RED WINES	Occasional use for lighter floral red styles.
WHITE WINES	Ideal when floral aromatic intensity is desired.
ROSÉ WINES	Widely used for intensely perfumed rosé wines.
ALL-PURPOSE	Suitable when floral esters and freshness retention are priorities.

FERMOL Lime

STRAIN / SPECIES	*Saccharomyces cerevisiae* — IFV Nantes selection
FERMENTATION PROFILE / KEY TRAITS	Low malic acid consumption; helps maintain acidity in hot-region musts. Responds strongly to amino-acid–based nutrients.
AROMATIC & SENSORY CONTRIBUTION	Accentuates grapefruit, lemon, and citrus-herbal notes; used to diversify Sauvignon Blanc styles away from heavy tropical thiols.
RECOMMENDED VARIETIES	Sauvignon Blanc, Pinot Grigio, Grüner Veltliner, cool-climate whites.
WHITE WINES	Recommended for thiolic citrus-driven aromatic whites.
ROSÉ WINES	Recommended when citrus and freshness expression is desired.
ALL-PURPOSE	Performs best when paired with FERMOPLUS Floral for thiol expression.

FERMOL Sauvignon

STRAIN / SPECIES	*Saccharomyces cerevisiae* — strain carrying IRC7 β-lyase gene
FERMENTATION PROFILE / KEY TRAITS	Releases varietal thiols from cysteine- and glutathione-bound precursors.
AROMATIC & SENSORY CONTRIBUTION	High olfactory intensity; blackcurrant, citrus, exotic fruit, thiolic floral notes.
RECOMMENDED VARIETIES	Sauvignon Blanc (including New Zealand style), Viognier, Verdelho, Traminer, Tocai, Garganega, other thiol-rich whites.
RED WINES	Not recommended.
WHITE WINES	Primary target: thiol-expressive aromatic whites.
ROSÉ WINES	Recommended thiolic rosé profiles.
ALL-PURPOSE	Best suited where thiol release and varietal lift are desired.

FERMOL Tropical

STRAIN / SPECIES	Hybrid *Saccharomyces cerevisiae* — IFV Nantes selection
FERMENTATION PROFILE / KEY TRAITS	Designed for broad and complex thiol development; benefits from sulfur-precursor nutrition.
AROMATIC & SENSORY CONTRIBUTION	Tropical and summer fruit with sage and aromatic herb nuances; elegant thiol spectrum.
RECOMMENDED VARIETIES	Fumé Blanc-style Sauvignon Blanc, Chardonnay, Marsanne, Viognier, Müller-Thurgau, Grillo.
RED WINES	Occasional use for light fruity reds.
WHITE WINES	Ideal for ripe-tropical and layered thiolic whites.
ROSÉ WINES	Good for tropical-lift rosé styles.
ALL-PURPOSE	Responds best with FERMOPLUS Tropical nutrient.

Rosé & light red fermentation

FERMOL PB2033

STRAIN / SPECIES	*Saccharomyces cerevisiae* — selected in Côtes de Provence
FERMENTATION PROFILE / KEY TRAITS	Wide temperature range (12–34 °C/53–93 °F), short lag-phase, regular kinetics. Limited anthocyanin adsorption, promoting optimized rosé color. Killer-neutral.
AROMATIC & SENSORY CONTRIBUTION	Red currant, sour cherry, raspberry, strawberry, white-flower notes.
RECOMMENDED VARIETIES	French-style rosé and young red wines.
RED WINES	Recommended for fresh young reds.
ROSÉ WINES	Primary application — Provence-style rosé.
ALL-PURPOSE	Strong implantation with controlled color behavior.

FERMOL Red Bouquet

STRAIN / SPECIES	*Saccharomyces cerevisiae* — IFV Nantes selection
FERMENTATION PROFILE / KEY TRAITS	Highly dominant strain minimizing stuck fermentations; produces thiols from sulfur precursors; high glycerol production; low YAN demand; does not consume malic acid.
AROMATIC & SENSORY CONTRIBUTION	Blackcurrant, plum, violets; smooth mid-palate from glycerol.
RECOMMENDED VARIETIES	Red and rosé wines requiring fruit intensity and freshness.
RED WINES	Ideal for fruit-forward reds with smooth texture.
ROSÉ WINES	Excellent for thiolic-floral rosé expression.
ALL-PURPOSE	Supports ML timing due to no malic consumption.

FERMOL Red Fruit

STRAIN / SPECIES	Hybrid *S. cerevisiae* — derived from FERMOL Iper R × PB2033
FERMENTATION PROFILE / KEY TRAITS	Performs under stressful conditions and high sugar; modest nutritional demand; clean aromatics without reduction when properly nourished.
AROMATIC & SENSORY CONTRIBUTION	Blueberry, blackcurrant, raspberry; designed for young fruity wines.
RECOMMENDED VARIETIES	Young reds with pronounced fruit character.
RED WINES	Ideal for fresh, youthful, aromatic reds.
ROSÉ WINES	Good for deeply fruity rosé styles.
ALL-PURPOSE	Performs well in low-YAN musts.

Low-temperature & hybrid strains

FERMOL Cryofruit

STRAIN / SPECIES	Hybrid: *S. cerevisiae* × *S. uvarum*
FERMENTATION PROFILE / KEY TRAITS	Selected for strong low-temperature metabolism, high glycerin production, short lag-phase, SO_2-resistant, good ethanol tolerance.
AROMATIC & SENSORY CONTRIBUTION	Boosts thiols; white-fruit and floral nuances in whites, small berries and violets in reds; enhanced softness from glycerol.
RECOMMENDED VARIETIES	Gamay, Syrah, Riesling, Traminer, semi-aromatic cultivars.
RED WINES	Useful for cold-fermented fruit-forward reds.
WHITE WINES	Ideal for very cold fermentations.
ROSÉ WINES	Performs well in cool, thiolic rosé styles.
ALL-PURPOSE	Designed for extra-cold fermentation conditions.

Red wine fermentation (structure & complexity)

FERMOL Grand Rouge

STRAIN / SPECIES	*Saccharomyces cerevisiae* — Navarra Institute selection
FERMENTATION PROFILE / KEY TRAITS	Short lag-phase, minimal nutritional needs, high ethanol and temperature tolerance, dominant strain suppressing indigenous flora; suitable for refermentation and concentrated musts.
AROMATIC & SENSORY CONTRIBUTION	Clean, varietal expression with good tannic structure.
RECOMMENDED VARIETIES	Reds requiring fermentation security and dominance.
RED WINES	Primary application: structured, clean reds.
ALL-PURPOSE	Useful for musts enriched with concentrate.

FERMOL Mediterranée

STRAIN / SPECIES	*Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	Selected to obtain warm, full-bodied red wines suitable for aging but already pleasant at the end of fermentation. Produces a high quantity of polysaccharides and mannoproteins, which harmonize palate structure and contribute to rapid stabilization of color and tannins. Very good fermentation kinetics and technological robustness.
AROMATIC & SENSORY CONTRIBUTION	Emphasizes varietal complexity and enhances sweet notes reminiscent of ripe fig jam and small red berries, especially redcurrant and cherry. Mouthfeel is round, with smooth, well-integrated tannins.
RED WINES	Primary target: structured, warm reds destined for medium to long aging, including organic programs where low YAN demand is an advantage.
ALL-PURPOSE	Well suited to co-inoculation with malolactic bacteria (e.g. MALOLACT) thanks to its polysaccharide release and stable fermentation profile.

FERMOL Premier Cru

STRAIN / SPECIES	*Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	Very low H_2S formation; produces glycerin, polysaccharides, and polyphenol extraction; minimal SO_2 production; facilitates MLF; killer-neutral.
AROMATIC & SENSORY CONTRIBUTION	Complex, intense aromatics; full-bodied mouthfeel.
RECOMMENDED VARIETIES	Structured reds for aging and typicity expression.
RED WINES	Highly recommended for premium age-worthy reds.
ALL-PURPOSE	Strong option when MLF integration and low sulfur are required.

FERMOL Rouge

STRAIN / SPECIES	*Saccharomyces cerevisiae*
FERMENTATION PROFILE / KEY TRAITS	"Work-horse" strain for difficult conditions; high temperature, low nutrition; strong dominance over indigenous flora; limited color adsorption.
AROMATIC & SENSORY CONTRIBUTION	Intense red berry aromas; medium structure; enhanced color intensity.
RECOMMENDED VARIETIES	Blush, young reds, medium-term aging wines.
RED WINES	Reliable for tough, high-stress fermentations.
ROSÉ WINES	Appropriate for deeper-colored rosé.
ALL-PURPOSE	Chosen when tank turnover and robustness are priorities.

FERMOL Super 16

STRAIN / SPECIES	*Saccharomyces cerevisiae* — originally isolated in Samos (Greece)
FERMENTATION PROFILE / KEY TRAITS	Adapted to high sugar and osmotic stress; supports raisins/overripe grapes; performs at high alcohol and temperature; strong extractive enzyme activity; excellent flocculation and easy filtration post-fermentation.
AROMATIC & SENSORY CONTRIBUTION	Clean, fresh fruit with long, complex finish.
RECOMMENDED VARIETIES	High-end Cabernet Sauvignon, passito-style or very ripe fruit reds.
RED WINES	Ideal for high-sugar, high-alcohol premium reds.
WHITE WINES	Can be used in passito or sweet whites.
ROSÉ WINES	Limited use.
ALL-PURPOSE	Excels in extreme or concentrated fermentations.

Hybrid & specialty red yeast

LEVULIA T.P.CO

STRAIN / SPECIES	Hybrid *S. cerevisiae* — IFV Nantes selection
FERMENTATION PROFILE / KEY TRAITS	Strong implantation capacity, high glycerol, phenolic extraction, killer phenotype, carries IRC7 β-lyase for thiol release; low nutritional needs; resistant to high alcohol (up to ~16.5% v/v) and high SO_2. Optimal fermentation temperature 18–25 °C/ 64–77.0 °F.
AROMATIC & SENSORY CONTRIBUTION	Intense floral and fruity profile; black fruits such as blueberry and blackberry.
RECOMMENDED VARIETIES	Big fruity reds — Australian-style Shiraz, Bordeaux varieties.
RED WINES	Primary application — full, aromatic, fruit-driven reds.
WHITE WINES	Occasional structured rosé.
ROSÉ WINES	Occasional structured rosé.

Sparkling & refermentation yeasts

FERMOL Perle

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STRAIN / SPECIES	Hybrid: *S. cerevisiae* × *S. uvarum* — selected for sparkling refermentation (UNIMORE selection)
FERMENTATION PROFILE / KEY TRAITS	High resistance to weak acids (e.g., carbonic acid under pressure), stable membrane potential, tolerant to cold and CO_2-rich conditions.
AROMATIC & SENSORY CONTRIBUTION	Balanced sparkling profiles; reliable secondary fermentation behavior.
RECOMMENDED VARIETIES	Bottle or tank refermentation; sparkling wines.
WHITE WINES	For base wines and secondary fermentation.
ROSÉ WINES	Suitable for sparkling rosé.
ALL-PURPOSE	Specifically designed for pied-de-cuve and pressure fermentations.

LEVULIA Cristal

STRAIN / SPECIES	*Saccharomyces cerevisiae* r.f. *bayanus* — Champagne region selection
FERMENTATION PROFILE / KEY TRAITS	High alcohol resistance, strong flocculation, reliable "prise de mousse," low volatile acidity production, low foaming, complete sugar consumption. Suitable for pied-de-cuve preparation and traditional-method aging on lees.
AROMATIC & SENSORY CONTRIBUTION	Clean fermentation profile with neutral aromatic impact, preserving base-wine typicity.
RECOMMENDED VARIETIES	Traditional-method sparkling and tank refermentation.
WHITE WINES	Primary application — Champenoise base & secondary fermentation.
ROSÉ WINES	Suitable for rosé sparkling production.
ALL-PURPOSE	Secure fermentations under pressure, alcohol, and CO_2 stress.

FERMOL Charmat

STRAIN / SPECIES	*Saccharomyces cerevisiae* r.f. *bayanus*
FERMENTATION PROFILE / KEY TRAITS	Exceptionally fast fermentation rate, strong cryophilic phenotype, high alcohol tolerance, low nutritional demand; successful in hard seltzers, ciders, and nutritionally unbalanced media. Excellent for restarting stuck fermentations. Killer-neutral.
AROMATIC & SENSORY CONTRIBUTION	Accentuates white-fruit and citrus notes without masking varietal aromas.
RECOMMENDED VARIETIES	Tank-method sparkling, difficult fermentations, cider & adjunct-sugar musts.
WHITE WINES	Ideal for Charmat-method and cold refermentations.
ROSÉ WINES	Good for fresh sparkling rosé profiles.
ALL-PURPOSE	Preferred when fermentation speed, low maintenance and reliability are required.

FERMOL Complet Killer Fru

STRAIN / SPECIES	*Saccharomyces cerevisiae* r.f. *bayanus* — fructophilic strain
FERMENTATION PROFILE / KEY TRAITS	Very strong fructose metabolism; killer phenotype ensures dominance in compromised musts; high alcohol tolerance; resistant at low temperatures; ideal for restart of stuck fermentations in red, rosé, and white wines.
AROMATIC & SENSORY CONTRIBUTION	Clean aromatic profile with minimal by-product formation.
RECOMMENDED VARIETIES	Restarting stuck or sluggish fermentations; partially fermented wines.
RED WINES	Highly effective for restart in high-alcohol or nutrient-limited reds.
WHITE WINES	Secure completion of stuck ferments with residual fructose.
ROSÉ WINES	Same restart benefit in cold or stressed rosé fermentations.
ALL-PURPOSE	Primary reference for fructophilic restart protocols.

Direct-inoculation range (ZYMASIL)

ZYMASIL Pronto Blanc

Direct-inoculation yeast + nutrient for white wines

STRAIN / SPECIES	Active dry *Saccharomyces cerevisiae* var. *bayanus* blended with a dedicated yeast nutrient based on ammonium salts, thiamine and yeast hulls.
FERMENTATION PROFILE / KEY TRAITS	Formulated for direct inoculation without rehydration, simplifying cellar operations while maintaining high viability and strong kinetics. 250 ppm contribute about 22 ppm of assimilable nitrogen (YAN). Ideal alcohol tolerance up to ~15.5% v/v; killer phenotype neutral; excellent copper resistance; low volatile acidity production.
AROMATIC & SENSORY CONTRIBUTION	Clean fermentations with reliable expression of white-fruit, floral and sweet-fruit notes.
WHITE WINES	Primary use: easy, robust fermentation of white musts with simplified handling and integrated nutrition.
ROSÉ WINES	Can be used for pale rosés where a white-wine style fermentation is desired.
ALL-PURPOSE	Ideal when direct inoculation and integrated nutrition are required under variable cellar conditions.

ZYMASIL Pronto Rouge

Direct-inoculation yeast + nutrient for red wines

STRAIN / SPECIES	Active dry *Saccharomyces cerevisiae* blended with yeast nutrient based on ammonium salts, thiamine and yeast hulls.
FERMENTATION PROFILE / KEY TRAITS	Direct-inoculation preparation for red wines, able to ferment successfully without prior rehydration. 250 ppm contribute about 22 ppm of assimilable nitrogen (YAN). Ideal alcohol tolerance up to ~15.5% v/v; killer-neutral; excellent copper resistance; low volatile acidity. Designed for fast kinetics and operational simplicity.
AROMATIC & SENSORY CONTRIBUTION	Expresses ripe red-fruit and berry notes, with emphasis on summer fruit, berries and small red fruits.
RED WINES	Main application: straightforward, reliable fermentations of red musts with integrated nutrition, particularly where ease of use and robust kinetics are priorities.
ALL-PURPOSE	Very convenient option for large fermenters or operations preferring no-rehydration protocols.

Non-*Saccharomyces* yeasts

NS FERM Alcomeno

IUVV Institut Jules Guyot

STRAIN / SPECIES	*Lachancea thermotolerans* — IUVV Dijon selection (Burgundy)
FERMENTATION PROFILE / KEY TRAITS	*Lachancea thermotolerans* diverts a portion of grape sugars toward lactic acid production instead of ethanol, resulting in natural acidification and reduced final alcohol. This metabolic pathway explains the strong link between lactic acid formation and alcohol reduction. LEVULIA Alcomeno is used in sequential inoculation ahead of *Saccharomyces cerevisiae*, allowing controlled early fermentation activity before hand-off to the main fermenter. Lactic acid production is highly temperature dependent, with warmer early fermentation temperatures promoting greater acid formation, while cooler conditions limit its activity. The strain can be easily and cleanly arrested by chilling the must to approximately 7–8 °C (45–46 °F), giving winemakers precise control over acidity, alcohol impact, and timing.
AROMATIC & SENSORY CONTRIBUTION	Improves freshness, tension, and aromatic precision while preserving varietal character. Wines show brighter fruit definition, enhanced balance, and increased mouthfeel energy due to higher natural acidity and lower ethanol perception.
RECOMMENDED VARIETIES	Alcohol reduction and acidity management programs; particularly effective in warm-climate or high-sugar musts where freshness and balance are at risk.
RED WINES	Enhances drinkability and balance in ripe or high-alcohol reds by moderating ethanol and increasing perceived freshness.
WHITE WINES	Excellent for restoring acid tension and aromatic clarity in warm-region or low-acid whites.
ROSÉ WINES	Ideal for producing crisp, vibrant rosés with higher natural acidity and moderated alcohol.
ALL-PURPOSE	A precision non-*Saccharomyces* tool enabling controlled acidification and alcohol reduction through temperature-managed, sequential fermentation strategies.

NS FERM Tiotoru

IUVV Institut Jules Guyot

STRAIN / SPECIES	*Torulaspora delbrueckii* — IUVV Dijon selection (Burgundy)
FERMENTATION PROFILE / KEY TRAITS	Used in sequential inoculation (~48 h before *S. cerevisiae*). Rapid implantation suppresses indigenous flora; autolysis during alcoholic fermentation releases nutrients and polysaccharides, reducing astringency and detoxifying the medium. Very low acetic acid formation in high-sugar musts.
AROMATIC & SENSORY CONTRIBUTION	High tropical thiol release; enhanced bouquet complexity and palate roundness.
RECOMMENDED VARIETIES	Sauvignon Blanc, Chardonnay, Gewürztraminer, Chenin, Riesling, Muscat, Sémillon.
RED WINES	Improves softness and mouthfeel via polysaccharide release.
WHITE WINES	Excellent for thiolic and semi-aromatic profiles.
ROSÉ WINES	Useful where texture + aromatic lift are desired.
ALL-PURPOSE	Supports microbial control during early fermentation.

NS FERM Bellissima

IUVV Institut Jules Guyot

STRAIN / SPECIES	*Metschnikowia pulcherrima* - IUVV Dijon selection (Burgundy)
FERMENTATION PROFILE / KEY TRAITS	Increases higher alcohols, ethyl esters, acetates, and terpenes; releases polysaccharides for volume and viscosity; contributes to persistence and softness. Produces pulcherriminic acids with bioprotective effect in must.
AROMATIC & SENSORY CONTRIBUTION	Sweet summer-fruit aromas; enhanced bouquet complexity when combined with *S. cerevisiae* strains (e.g., FERMOL Chardonnay, Arôme Plus).
RECOMMENDED VARIETIES	Aromatic enhancement programs and bioprotection strategies.
RED WINES	Adds roundness and aromatic complexity in co-fermentations.
WHITE WINES	Excellent for balanced aromatic enhancement.
ROSÉ WINES	Ideal for fruity, textural rosé styles.
ALL-PURPOSE	Used in combination / co-inoculation for aroma + texture synergy.

SNS BLENDS (non-*Sacch* + *Saccharomyces*)

SNS FERM Fruit

Non-*Saccharomyces* / *Saccharomyces* blend for acidity management and fruity complexity

IUVV Institut Jules Guyot

STRAIN / SPECIES	Blend of *Lachancea thermotolerans* and *Saccharomyces cerevisiae* PB1264 (thiol-releasing red/rosé strain) — IUVV Dijon selection (Burgundy).
FERMENTATION PROFILE / KEY TRAITS	Direct-inoculation blend (no separate sequential *Saccharomyces* addition needed). Rapid implantation competes with and inhibits undesirable indigenous flora and limits volatile acidity. The *Lachancea* component manages acidity and contributes aromatic compounds; gradual autolysis releases amino acids and detoxifying yeast hulls, reducing astringency and increasing palate volume. Helps lower potential alcohol by about 1% v/v, especially at 22–26 °C/71.6–78.8 °F. Alcohol tolerance ~14.5% v/v. High temperatures (>26–28 °C / 79–82 °F) may reduce lactic acid production, increase the risk of volatile acidity, and shorten *Lachancea* dominance during fermentation.
AROMATIC & SENSORY CONTRIBUTION	Enhances fruity bouquet and complexity, increases persistence and volume on the palate; ideal for fresh, juicy styles.
RED WINES	Light and fresh reds where lifted red-fruit aromatics, higher acidity, slightly lower alcohol and reduced astringency are desired.
WHITE WINES	Whites where aromatic complexity and a fresher acid profile are targeted.
ROSÉ WINES	Very suitable for rosés with pronounced fruit, freshness, and volume.
ALL-PURPOSE	For terpenic and thiolic varieties when both acidity management and aromatic lift are required, in a simple one-step inoculation.

SNS FERM Le Fleur

Non-*Saccharomyces* / *Saccharomyces* blend for floral aromatic complexity

STRAIN / SPECIES	Blend of *Torulaspora delbrueckii*, *Lachancea thermotolerans* and *Saccharomyces cerevisiae* (IFV Nantes selection)
FERMENTATION PROFILE / KEY TRAITS	Direct-inoculation blend; rapid implantation inhibits undesirable flora and limits volatile acidity. The enzyme pool from *T. delbrueckii* and *L. thermotolerans* promotes varietal thiol release, aromatic compound formation and partial conversion of sugars to lactic acid instead of ethanol, increasing total acidity and lowering pH. Typical alcohol reduction is 0.8–1% v/v at 22–26 °C/71.6–78.8 °F. Autolysis of the non-*Sacch* strains gradually releases amino acids and detoxifying hulls, softening astringency and increasing roundness via membrane polysaccharides. Alcohol tolerance ~13.5% v/v.
AROMATIC & SENSORY CONTRIBUTION	Marked floral notes (jasmine, linden, hawthorn, yellow flowers) with persistent citrus tones ranging from mandarin to pink grapefruit; greater aromatic balance and complexity with a fresher, more vibrant palate.
RED WINES	For lighter reds where floral top-notes and softer tannins are desirable.
WHITE WINES	Excellent for floral-driven whites requiring higher acidity and lower pH.
ROSÉ WINES	Ideal for rosés with intense floral and citrus aromatic profile and crisp freshness.
ALL-PURPOSE	When the goal is to combine alcohol reduction, higher acidity and strong floral complexity in a single direct inoculation.

SNS FERM Thiol

STRAIN / SPECIES	Blend — 70% non-*Saccharomyces* (*T. delbrueckii*) and 30% *Saccharomyces cerevisiae* (FERMOL Sauvignon) — IUVV Dijon selection (Burgundy)
FERMENTATION PROFILE / KEY TRAITS	Direct-inoculation hybrid (no sequential addition needed). Rapid implantation suppresses indigenous flora and limits VA-producing species. Early *Torulaspora* metabolism releases thiols and aroma compounds. Sequential fermentation with *T. delbrueckii* consumes part of the sugars with a lower ethanol yield, typically resulting in a reduction of ~ 0.5% (v/v) alcohol. Subsequent autolysis releases amino acids and polysaccharides, improving roundness, softness, and fermentation stability.
AROMATIC & SENSORY CONTRIBUTION	Major enhancement of aromatic complexity — thiolic, floral, fruity, and textural lift.
RECOMMENDED VARIETIES	Sauvignon Blanc, Chardonnay, Gewürztraminer, Colombard, Riesling, Muscat, Sémillon.
RED WINES	In red wines, early *T. delbrueckii* activity contributes to a lift in fruity esters and thiol-derived precursors, typically perceived as brighter red-berry aromatics and improved freshness.
WHITE WINES	Primary application, multi-layered thiolic aromatics.
ROSÉ WINES	Very effective for complex aromatic rosé.

PRIMAFLORA VB

Bioprotection culture for white, rosé, and red wines

STRAIN / SPECIES

Ready-to-use bioprotective blend of active dry non-*Saccharomyces* yeasts: *Metschnikowia pulcherrima* and *Torulaspora delbrueckii*, supported by detoxifying yeast hulls.

FERMENTATION PROFILE / KEY TRAITS

PRIMAFLORA VB is designed for microbiological protection of grapes and must in the absence of SO_2. The selected non-*Saccharomyces* yeasts rapidly colonize the medium, occupying the ecological niche and inhibiting the development of spoilage microorganisms.
The formulation helps limit oxidative color shifts, reducing yellow/orange hues, while moderating the extraction of skin polyphenols and tannins, particularly in white and rosé processing. Integrated yeast hulls contribute to must detoxification, improving fermentation conditions and preparing the medium for a clean and reliable alcoholic fermentation with *Saccharomyces*.

AROMATIC & SENSORY CONTRIBUTION

PRIMAFLORA VB supports fresher and brighter color expression, green/silver tones in whites, pale to powder-pink in rosés, and stable flavylium expression in reds. It helps reduce vegetal notes, enhances the expression of varietal aromatic precursors, and contributes to wines with cleaner, brighter aromatic profiles and improved freshness on the nose.

RED WINES

Can be applied on red grapes from reception through cold soak, limiting spoilage flora prior to *Saccharomyces* inoculation.

WHITE WINES

Ideal for SO_2-free processing from harvest through clarification; promotes pale color, lower phenolic pickup, and enhanced aromatic potential.

ROSÉ WINES

Particularly suited for producing very pale rosés with low catechin extraction and intense floral and fresh aromatics.

APPLICATION POINTS

PRIMAFLORA VB is a vineyard- and winery-ready bioprotective culture and can be applied:
- On grape harvesters
- In hoppers
- Sprayed on receiving conveyors.

KEY BENEFITS

- Reduces yellow hues, favoring green and silver tones
- Minimizes extraction of skin polyphenols and tannins
- Lowers vegetal aromas
- Enhances expression of aromatic precursors
- Inhibits spoilage microorganisms without SO_2
- Detoxifies must via yeast hulls.

INSTRUCTIONS FOR USE

- Rehydrate in non-chlorinated water at a minimum ratio of 1:10
- Vineyard application: use water at ambient temperature
- Winery application: rehydrate at 77–86 °F (25–30 °C).
- Apply immediately after rehydration for optimal performance.

STORAGE

Store below 68 °F (20 °C) in a dry environment.

Yeast rehydration and acclimation

1. Using clean, sanitized equipment, prepare rehydration water at a rate of 10 L/kg of yeast (≈ 1.2 gal/lb of yeast).

   Water temperature:
   - *Saccharomyces cerevisiae*: 39 °C (102 °F)
   - *Bayanus* strains: 41 °C (105 °F)

2. Add **FERMOPLUS Energy Glu 4.0** at 25% of the yeast weight, equivalent to 1 part Energy Glu 4.0 per 4 parts yeast.

   While gently stirring, slowly add the nutrient first, followed by the yeast. Ensure all clumps are fully dispersed. Avoid aggressive mixing (drills, high shear), which may damage yeast cell membranes. Gentle mixing with adequate oxygen incorporation is recommended. Oxygen, together with the amino acids supplied by Energy Glu 4.0, supports the development of a larger and more resilient yeast biomass.

3. After 20–30 minutes, the yeast is fully rehydrated and requires an immediate sugar source to remain viable.

   Begin acclimation by gradually adding must to the yeast suspension:
   - slowly add an amount of must equal to the yeast slurry volume over ~5 minutes, stirring gently
   - ensure the temperature drop does not exceed 5 °C at any point, as larger drops reduce yeast viability.

4. After 15 minutes, repeat the addition with another equal volume of must, again maintaining a temperature differential ≤ 5 °C.

5. Continue this stepwise acclimation every 15 minutes until the yeast mixture is within 5 °C of the tank temperature. At that point, inoculate the tank, ensuring proper venting to release CO_2 pressure.

Restarting a stuck or sluggish fermentation

Target volume: 10,000 gallons (≈ 378 hL)
Suggested rates below may be adjusted depending on severity.

PRODUCT	DOSE	PPM (APPROX.)
FERMOL Complet Killer Fru	2–4 lb / 1,000 gal	120 ppm
FERMOPLUS Energy Glu 4.0	25% of yeast dose	60–120 ppm
FERMOPLUS Integrateur 20KD 2.0	1 lb / 1,000 gal	Amylic, candy-like esters, yellow fruit
CELLOFERM	1 lb / 1,000 gal	120 ppm

1

Fermenter preparation

Wine temperature: 18–20 °C (64–68 °F)
Add:
- FERMOPLUS Integrateur 20KD 2.0 at 120 ppm
- CELLOFERM at 120 ppm (cellulose for toxin adsorption).

2

Prepare the wine

- Rack off gross lees into a sanitized tank
- Add CELLOFERM at 120 ppm (1.5 lb / 1,000 gal) during racking.

3

Prepare the yeast

Water: 2.5 gal / 1,000 gal wine, heated to 40 °C (104 °F)
Add:
- FERMOPLUS Energy Glu 4.0: 60 ppm
- FERMOL Complet Killer Fru: 240 ppm.

Rehydrate 20 minutes, record temperature.

4

Re-inoculation

- Add stuck wine incrementally (≤ 5 °C temperature change)
- Add light grape concentrate at 240 ppm
- Hold starter 12 hours at ~21 °C (70 °F)
- Confirm active fermentation via RS drop.

5

Once active

- Stepwise build starter with additional wine (up to 10% of tank volume)
- Maintain 21–24 °C (70–76 °F)
- Transfer starter back to main tank once fermentation is clearly established.


02

Nutrients

Fermentation Nutrition

Product Overview

CATEGORY	PRODUCT	APPROX. COMPOSITION	PRIMARY PURPOSE	YAN / FAN CONTRIBUTION (PER 100 PPM)	BEST USE / STYLE	TIMING OF ADDITION
Rehydration	FERMOPLUS Energy Glu 4.0	Yeast amino acids, vitamins, minerals, glutathione	Improves yeast reactivation and implantation	None (not a YAN product)	All fermentations; yeast health	Added to rehydration water
Rehydration	FERMOPLUS Energy Glu 3.0	Yeast derivatives, micro-elements, glutathione	Supports restart and early fermentation	None (not a YAN product)	Restart / difficult ferments	Rehydration or restart protocol
YAN Correction	ENOVIT Perlage	DAP + thiamine	Nitrogen correction for sparkling / tirage	≈22 mg/L YAN	Sparkling base wines	Beginning of fermentation
YAN Correction	FERMOCEL P	DAP + cellulose + thiamine	YAN correction and inhibitor adsorption	≈11 mg/L YAN	Clarified musts, and low NTU's juices in general (Mead – Cider)	Early fermentation
YAN Correction	FERMOPLUS Integrateur 20KD 2.0	DAP + <20 kDa yeast derivatives + thiamine	Stress resistance, sluggish ferment prevention	≈15 mg/L YAN + FAN	Demanding musts	Split additions
Organic YAN	FERMOPLUS Dap Free	Organic yeast nitrogen, vitamins, sterols	Progressive organic nitrogen supply	≈8–10 mg/L FAN	Organic / low-input programs	Early fermentation
Varietal Reds	FERMOPLUS Premier Cru	Organic & inorganic nutrients + ellagic tannins	Enhances red varietal expression	≈11–12 mg/L YAN	Structured reds	Early–mid fermentation
Varietal Whites	FERMOPLUS Blanc Varietal	Organic & inorganic nutrients + ellagic tannins	Enhances white varietal aromatics	≈11 mg/L YAN	Aromatic whites	Split additions
Varietal / FAN	FERMOPLUS Rosé	Yeast derivatives rich in ester precursors	Berry and floral rosé aromatics	≈8–10 mg/L FAN	Rosé wines	Start of active fermentation
Varietal / FAN	FERMOPLUS Floral	Targeted amino acid spectrum	Floral aromatic lift	≈8–12 mg/L FAN	Floral whites	Early–mid fermentation
Varietal / FAN	FERMOPLUS Tropical	High amino-acid fraction	Tropical and ripe fruit notes	≈8–12 mg/L FAN	Warm-climate whites / reds	Early–mid fermentation
Varietal / FAN	FERMOPLUS Cocoa	Yeast derivatives + skin tannins	Cocoa, spice and ripe fruit tones	≈7–10 mg/L FAN	Reds	After YAN correction

CATEGORY	PRODUCT	APPROX. COMPOSITION	PRIMARY PURPOSE	YAN / FAN CONTRIBUTION (PER 100 PPM)	BEST USE / STYLE	TIMING OF ADDITION
Varietal / FAN	**FERMOPLUS Red Berry**	Yeast-derived ester precursors	Fresh red berry expression	≈8–10 mg/L FAN	Young reds	Early–mid fermentation
Varietal / FAN	**FERMOPLUS Spicy Fruit**	Spice-oriented amino acid profile	Spicy / earthy lift	≈8–10 mg/L FAN	Pinot Noir, Syrah, Malbec	Early–mid fermentation
Varietal / FAN	**FERMOPLUS Mentol**	Balsamic / herbal precursors	Mint / sage freshness	≈8–10 mg/L FAN	Aromatic programs	Early–mid fermentation
Thiol Support	**FERMOPLUS Sauvignon (Wine)**	Cysteine-rich yeast derivatives + skin tannin	Thiol precursor support	≈8–12 mg/L FAN	Sauvignon & thiol whites	Early–mid fermentation
Varietal / FAN	**FERMOPLUS Prosecco**	Glera-inspired amino acid profile	Clean citrus/floral Charmat profile	≈8–10 mg/L FAN	Charmat sparkling	Early–mid fermentation
NS Support	**FERMOPLUS Non Sacch**	Yeast hulls + autolysates	Supports non-*Saccharomyces* activity	≈8–10 mg/L FAN	NS/SNS fermentations	Before NS inoculation
Corrective	**FERMOPLUS PyrOff**	Autolysate + yeast cell walls	Adsorbs methoxypyrazines	Negligible	Under-ripe fruit	Early fermentation
Processing Aid	**CELLOFERM**	Cellulosic adsorbent	Detox before restart	None	Stuck fermentations	Before restart

Fermentation nutrients & processing supports

Wine yeast nutrition has improved both the quality of wines and the efficiency of cellar operations. Over the last two decades, winemaking has shifted from relying mainly on mineral nitrogen (DAP) to more sophisticated nutrient strategies based on naturally derived amino acids, vitamins, micro-elements and yeast fractions, which also act as aroma precursors and redox modulators. **AEB** has been among the companies **leading this evolution in yeast nutrition and fermentation management**.

All products in this chapter are designed to help maintain regular fermentation, support yeast performance under demanding conditions, and assist winemakers in achieving specific aromatic and structural objectives. They are manufactured under **HACCP and ISO 9001 quality systems** and formulated in accordance with **OIV / Codex Oenologique** principles.

In the United States, Canada, and Mexico, these products are intended for use as fermentation nutrients and processing aids within the framework of applicable national wine and food regulations (including, in the USA, TTB 27 CFR §24.246 for authorized fermentation materials), and in line with good manufacturing practice and winery record-keeping.

Rehydration nutrients

FERMOPLUS Energy Glu 4.0

Rehydrate the yeast at lower temperature

TECHNOLOGICAL ROLE

FERMOPLUS Energy Glu 4.0 is a next-generation rehydration nutrient that allows yeast to be rehydrated in water at approximately 20 °C / 68 °F, helping wineries save energy while maintaining vigorous fermentations. The formulation is enriched with specific amino acids, sterols, natural glutathione and minerals, designed to support optimal cell growth right from reactivation.

- The high content of naturally derived amino acids and vitamins gives yeast exceptional vigor immediately upon rehydration, significantly increasing multiplication rate.
- By supplying readily assimilable amino acids, the product reduces the need for the yeast to synthesize them, saving energy that can be redirected to biomass production, particularly important during the hydration phase, when energy demand is at its peak.
- Natural sterols and trace minerals improve membrane fluidity compared to previous formulations, supporting membrane activity and yeast vitality under tough conditions.
- A specialized enzymatic lysis of yeast cells increases glutathione content; this natural antioxidant helps set optimal fermentation conditions, reduces cell aging and supports yeast in fully expressing its potential, often compromised by metabolic imbalances.

USAGE & DOSAGE

- Add directly to the rehydration water together with the yeast.
- Dosage: 1:4 relative to yeast inoculum (e.g., 200 ppm of yeast requires 50 ppm of FERMOPLUS Energy Glu 4.0).

FERMOPLUS Energy Glu 3.0

TECHNOLOGICAL ROLE

FERMOPLUS Energy Glu 3.0 is a rehydration nutrient optimized for low additions, rich in micro-elements and glutathione. Its original formula has been further enriched with naturally derived amino acids, sterols and vitamins to enhance yeast activity, multiplication and biomass formation.

- Glutathione helps reduce cell aging linked to free radicals, especially during oxygenation frequently applied at rehydration.
- The balanced composition makes this product particularly useful for restarting stuck fermentations or accelerating sluggish ones, where fast, robust reactivation is needed.

USAGE & DOSAGE

- Dissolve directly in rehydration water along with the yeast.
- Dosage: 1:4 relative to yeast inoculum (e.g., 200 ppm of yeast requires 50 ppm of FERMOPLUS Energy Glu 3.0).

High-YAN fermentation nutrients
(with Mineral Nitrogen, DAP)

ENOVIT Perlage

TECHNOLOGICAL ROLE

ENOVIT Perlage is the evolution of ENOVIT P, manufactured using a technology that improves dispersion and solubilization, particularly valuable in refermentation for sparkling wines. It contains DAP and thiamine (0.3%), allowing winemakers to re-establish the desired nitrogen level while providing a balanced thiamine supplement.

- Thiamine partially reduces the formation of higher alcohols (which can add coarseness) and favors the formation of β-phenylethyl alcohol, contributing to a more refined aromatic profile.

USAGE & DOSAGE

- Dissolve in must or wine and add to the tank.
- Typical dosage: about 100 ppm (according to YAN content); 100 ppm provides ~22 ppm of YAN.

FERMOCEL P

TECHNOLOGICAL ROLE

FERMOCEL P is a long-established formulation of DAP, cellulose and thiamine, widely used especially for white varieties that benefit from must fining.

- Cellulose provides physical support to yeast cells in low-NTU musts and at cold fermentation temperatures, helping keep biomass suspended and active.
- Cellulose also assists in adsorbing long-chain fatty acids and toxins that may inhibit yeast.
- Combined with DAP and thiamine, it promotes both nutrient supply and physical conditions conducive to a healthy fermentation.

USAGE & DOSAGE

- Dissolve in must or wine and add at the beginning of fermentation.
- Dosage: 150–200 ppm (100 ppm supplies ~11 ppm YAN).

FERMOPLUS Blanc Varietal

Fresh & delicate whites

TECHNOLOGICAL ROLE

FERMOPLUS Blanc Varietal is a complex nutrient designed for aromatic white wines fermented at low temperature and for clarified or nutritionally reduced musts, where additional support is required to maintain clean fermentation kinetics and a fresh, fruit-forward aromatic profile.

RECOMMENDED TIMING

Add after initial nitrogen correction (if required), typically between day 2 and day 5 of fermentation.

SUGGESTED DOSAGE

250–500 ppm - (≈ 2–4 lb / 1,000 gal)
YAN contribution ≈ 11 mg/L YAN per 100 ppm (10 g/hL)

ADJUSTMENT CRITERIA

Use the higher end of the range when:

- **must composition** (lower natural YAN, clarified / low-solids musts → *increase dose to reinforce metabolic support*)
- **fermentation temperature** (very cold ferments → *prefer split additions to avoid early nutritional shock*)
- **aromatic objective** (greater expression of floral / citrus notes → *time the addition closer to early-mid fermentation*).

FERMOPLUS Premier Cru

Structured reds & high-potential ferments

TECHNOLOGICAL ROLE

FERMOPLUS Premier Cru is a complex nutrient developed for structured red wines and fermentations characterized by:

- high alcohol potential
- elevated phenolic content
- extended maceration or aggressive extraction
- stressful fermentation dynamics.

RECOMMENDED TIMING

Apply during active fermentation, generally in one or two additions, adapted to fermentation conditions:

- first addition during early-mid fermentation
- second addition only when stress factors justify it.

SUGGESTED DOSAGE

250–500 ppm - (≈ 2–4 lb / 1,000 gal)
YAN contribution: typical contribution: ≈ 8–12 mg/L YAN per 100 ppm (10 g/hL).

ADJUSTMENT CRITERIA

Increase dose and/or split additions when must analyses show: high °Brix, low YAN, thick skins / high solids → *use higher ppm and consider two additions.*

FERMOPLUS Integrateur 20KD 2.0

TECHNOLOGICAL ROLE

FERMOPLUS Integrateur 20KD 2.0 is a complex nutrient that includes a calibrated portion of thiamine, yeast-derived amino acids, sterols and vitamins, plus DAP. This combination supports yeast cell health and the development of clean aromatics while supplying a significant amount of YAN. FERMOPLUS Integrateur 20KD 2.0 contains low-molecular-weight yeast derivative fractions (< 20 kDa) that are more readily assimilated by wine yeast than larger cell wall fragments. These small peptides, amino acids and glycoproteid colloids can be directly taken up by yeast transport systems during the early and mid-fermentation phases, supporting biomass growth, enhancing metabolic vigor and helping prevent sluggish or stuck fermentations. The accessible nature of these < 20 kDa fractions complements the mineral nitrogen supplied by ammonium phosphate, contributing to a balanced nutrient environment that supports complete and regular alcoholic fermentation in demanding musts.

- The DAP fraction provides rapid mineral nitrogen, while the yeast-derived fraction contributes organic nitrogen and micronutrients.
- The enriched composition helps prevent sluggish and stuck ferments and supports balanced aromatic development.

USAGE & DOSAGE

- Dissolve in must or wine and add at the beginning of fermentation, ideally splitting the total dose into two or three additions.
- Typical dosage: around 200 ppm, bringing approx. 15 ppm YAN per 100 ppm of product, plus an important contribution of easily assimilable amino acids.

DAP-Free fermentation nutrients

FERMOPLUS Dap Free

TECHNOLOGICAL ROLE

FERMOPLUS Dap Free is a DAP-free complex nutrient based on yeast-derived amino acids, B-vitamins, sterols and natural micro-elements. It is designed to:

- optimize biomass formation when used in the early stages of fermentation
- support the formation of esters and integration of free amino nitrogen when added during fermentation.

This makes it particularly suitable for low-input and organic-oriented ferments where mineral nitrogen (DAP) is limited or restricted.

USAGE & DOSAGE

Dosage: 240–600 ppm (2–5 lb / 1,000 gal), depending on must YAN and stylistic goals.

FERMOPLUS varietal line

Concept & timing

The FERMOPLUS varietal line is designed less for bulk YAN contribution and more for:

- **fermentation health**
- **biomass formation**
- and especially for the **natural expression of varietal esters and thiols**.

The specific, yeast-derived, amino acids supplied (e.g. isoleucine, leucine, valine, arginine) are key precursors for:

- amyl acetates (banana, cotton candy)
- isoamyl esters (fruity, ripe)
- isobutyl acetates (flowers, white fruits)
- more complex, varietal-specific aromatic profiles.

These nutrients also provide:

- **sterols**: to reinforce the membrane and help withstand stress from high temperature and alcohol
- **amino acids**: nitrogen source and aroma precursors
- **glutathione and cysteine**: sulfur-containing compounds that act as natural antioxidants and precursors for aromatic thiols, as well as redox buffers in the must.

Timing of addition

To optimize aroma enhancement, these nutrients are generally recommended:

- between the second and fourth day of alcoholic fermentation.
- in musts particularly low in YAN, the nitrogen level should first be adjusted at the beginning of fermentation using ENOVIT Perlage, FERMOPLUS Integrateur, or FERMOCEL P, before adding the varietal nutrient.

FERMOPLUS Cocoa

TECHNOLOGICAL ROLE

Yeast-derived nutrient with fruity and spicy AA precursors, enhancing natural notes of:

- plum, cherry and violet in younger wines
- chocolate, tobacco, cigar box and carob in wines destined for aging.

USAGE & DOSAGE

- Dissolve in must or wine and add to the tank after YAN has been adjusted with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Floral

TECHNOLOGICAL ROLE

Yeast-derived amino acids prevalent in this nutrient boost a bouquet reminiscent of roses and white flowers. Recommended for varieties such as Pinot Grigio, Trebbiano, Grüner Veltliner, Marsanne, and wherever a floral bouquet is desired.

USAGE & DOSAGE

- Dissolve in must or wine and add to the tank after YAN adjustment with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Tropical

TECHNOLOGICAL ROLE

The high content of selected yeast-derived amino acids supports a ripe fruit aromatic profile, making it ideal for Chardonnay, Viognier, and also Syrah and Tempranillo.

USAGE & DOSAGE

- Dissolve in must or wine and add after YAN has been adjusted with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Sauvignon

TECHNOLOGICAL ROLE

Nutrient based on yeast derivatives rich in **cysteine and glutathione**, sulfur-containing compounds that are precursors of aromatic thiols such as: 4-MMP (box tree), 3-MH (citrus) and 3-MHA (tropical).
The product works particularly well with IRC7-positive yeasts (e.g., FERMOL Sauvignon, FERMOL Lime, FERMOL Fleur, FERMOL Tropical) and also contains grape skin tannins that supply additional thiol precursors.

USAGE & DOSAGE

- Dissolve in must or wine and add after YAN adjustment with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Prosecco

TECHNOLOGICAL ROLE

Formulated by taking inspiration from the HPLC amino-acid profile of Glera must, FERMOPLUS Prosecco enhances typical white-flower and citrus aromas desired in base wines for Charmat refermentation.

USAGE & DOSAGE

- Dissolve in must or wine and add after YAN has been adjusted with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Red Berry

TECHNOLOGICAL ROLE

Nutrient formulated to enhance esters reminiscent of red fruits present in every red wine. Particularly suited for young reds such as Gamay from carbonic maceration, Bordeaux blends, young Pinot Noir, Petite Sirah and other reds to be enjoyed young and fresh.

USAGE & DOSAGE

- Dissolve in must or wine; add after YAN adjustment with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Rosé

TECHNOLOGICAL ROLE

Nutrient based on yeast derivatives that brings into fermentation precursors of esters reminiscent of roses, red fruits and wild berries. Particularly suited for thiolic and amylic rosés with lighter color and delicate bouquet.

USAGE & DOSAGE

- Dissolve in must or wine and add at the start of vigorous fermentation, after YAN has been adjusted with DAP-based nutrients during the lag phase.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Spicy Fruit

TECHNOLOGICAL ROLE

Yeast-derived nutrient rich in amino acids that, beyond supporting fermentation, contributes precursors that boost cleaner earthy aromatics typical of varieties like Pinot Noir, Malbec, Syrah, Durif and Nebbiolo.

USAGE & DOSAGE

- Dissolve in must or wine; add after YAN adjustment with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

FERMOPLUS Mentol

TECHNOLOGICAL ROLE

The aromatic precursors enhanced by this nutrient help boost mint, sage and black tea notes, typical of certain Bordeaux-variety styles where a balsamic touch is desired.

USAGE & DOSAGE

- Dissolve in must or wine and add after YAN adjustment with DAP-based nutrients.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).

Specialty nutrient

FERMOPLUS PyrOff

TECHNOLOGICAL ROLE

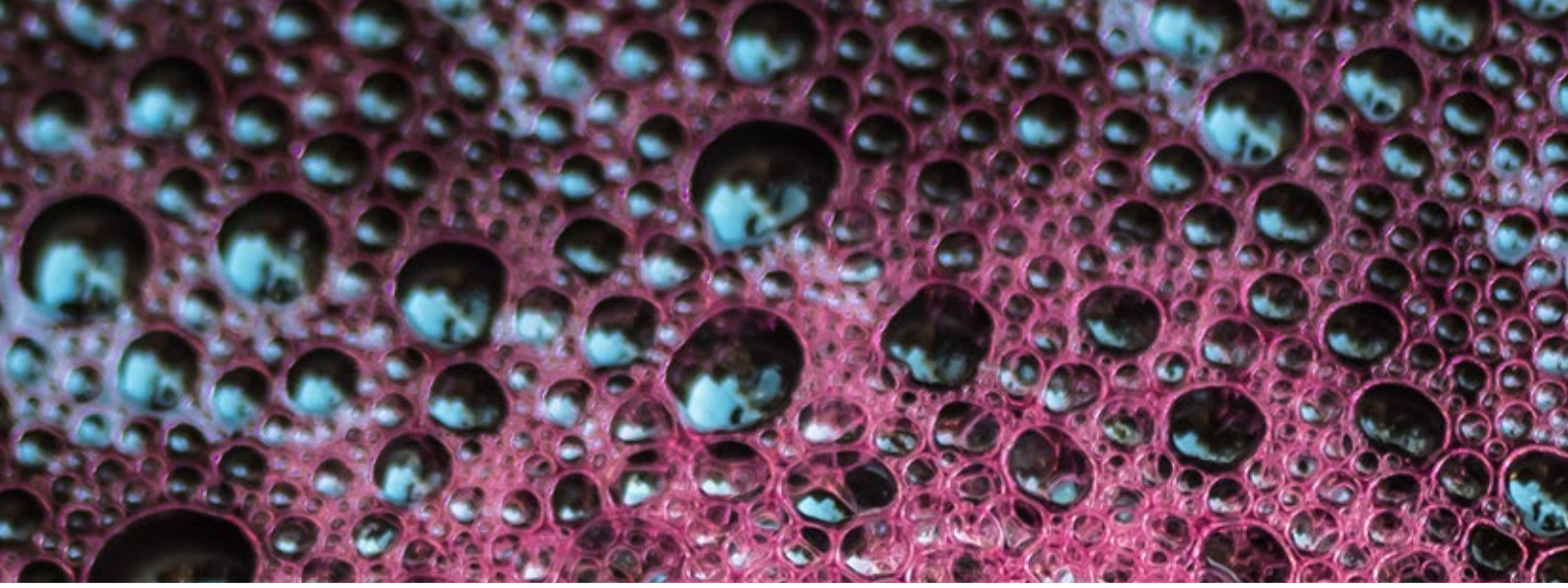
Nutrient based on autolysate and yeast cell walls with high adsorbent power. Its functioning is based on the synergistic action of:

- lysate, which promotes fermentation and aroma production
- cell walls, which adsorb methoxypyrazines, responsible for green/bell-pepper notes in varieties such as Cabernet Franc, Cabernet Sauvignon, Merlot, Pinot Noir, Sauvignon Blanc, Chardonnay and Riesling.

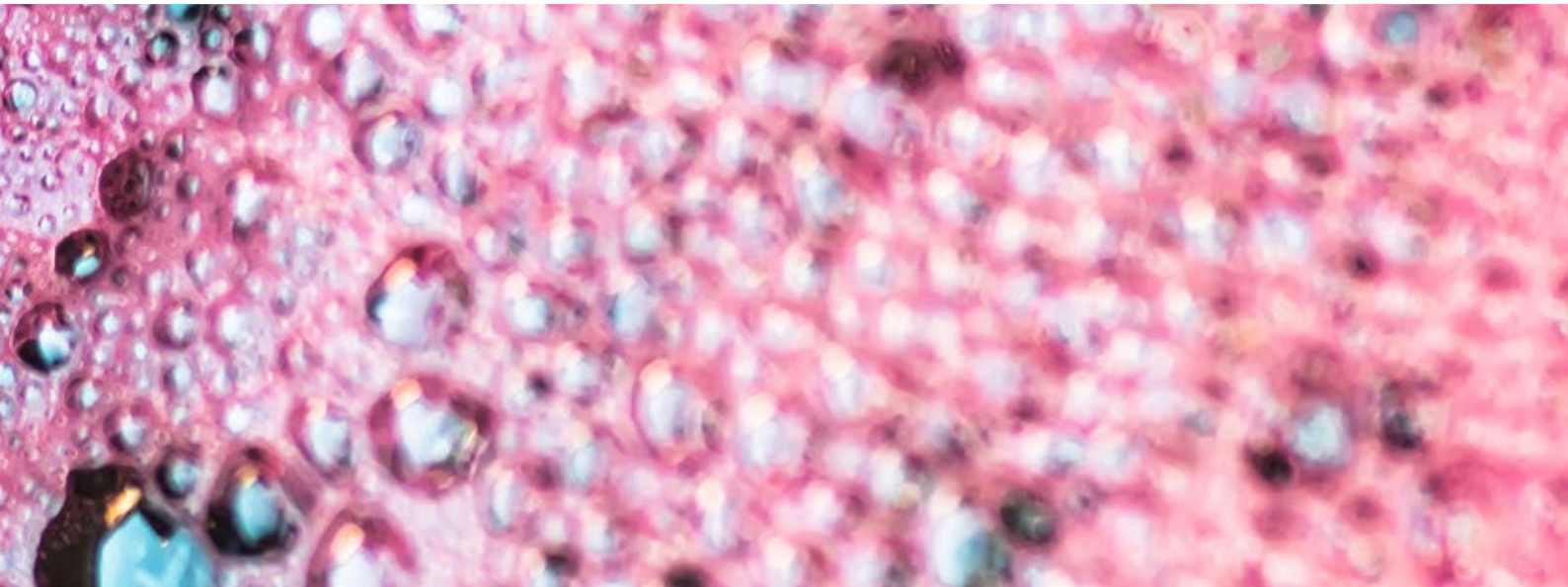
USAGE & DOSAGE

- Works better if added right after pectolytic enzymes have finished their activity and pyrazines have been released.
- Dosage: 250–500 ppm (2–4 lb / 1,000 gal).


03



Malolactic Bacteria



AEB malolactic bacteria

PRODUCT	BACTERIA / TYPE	PRIMARY APPLICATION	KEY DIFFERENTIATION	IDEAL CONDITIONS	ADDITION PROTOCOL	DOSAGE / FORMAT
MALOLACT Rapid	*Oenococcus oeni*	Fast, reliable MLF (co- or post-AF)	Rapid kinetics, fresh fruit profile, soft tannin integration	pH >3.15 l 18–24 °C l Alc ≤15%	Direct add; co-inoculate ~2 days after AF start; avoid SO_2 spikes	Pre-dosed: 2.5 / 25 / 250 / 1,000 hL
MALOLACT Acclimatée 4R	*Oenococcus oeni*	Big reds, harsh ML conditions	High phenolic & alcohol tolerance	pH ≥3.2 l ~18 °C l SO_2 ≤60 ppm l Alc ≤15%	Direct add; stable temperature, low O_2	Pre-dosed: 2.5 / 25 / 250 / 1,000 hL
MALOLACT Acclimatée	*Oenococcus oeni*	Standard ML conditions	Secure implantation without rehydration	Moderate temps l low–mod SO_2 l <30 °C	Direct add; co-inoculate after yeast lag-phase	Pre-dosed: 2.5 / 25 / 250 / 1,000 hL
MALOLACT Plantarum Uno	*Lactobacillus plantarum*	Co-inoculation, high-pH wines	Broad enzyme activity, OTA & Brett reduction	20–26 °C l SO_2 ≤30 ppm l high pH suited	Pre-suspend in must/ water; avoid cold shock	25 hL packs
FERMOPLUS Malolactique 2.0	MLB Nutrient	ML support & stress protection	Faster MLF, glutathione aroma protection	—	Add to inoculation or tank at ML start	200 ppm l 5 kg bags

Malolactic fermentation

Malolactic fermentation (MLF) is the biological conversion of malic acid into lactic acid by selected lactic acid bacteria. Beyond softening acidity and rounding the mouthfeel, **controlled MLF improves microbial stability, prevents the formation of off-flavors, and reduces the risk of biogenic amines** that may arise from spontaneous indigenous flora.

Inoculated MLF ensures a **clean sensory profile**, greater predictability, and safer fermentation outcomes in modern winemaking.

AEB focuses on *Oenococcus* oeni and *Lactobacillus plantarum*, chosen for performance under real-cellar stress: alcohol, pH, temperature, SO_2 and phenolic load. These strains are supported by dedicated nutrients that improve implantation, shorten lag time, and help guarantee complete malic conversion even under harsh conditions.

MALOLACT range

MALOLACT Rapid

Fast & reliable
Oenococcus oeni

ACTIVITY & APPLICATION SCOPE

MALOLACT Rapid is a high-performance freeze-dried culture of *Oenococcus oeni* produced using advanced biomass-protection technology. It is suitable for both co-inoculation and post-AF inoculation, delivering rapid, secure MLF with fresh, fruity aromatic expression and softer palate integration. Wines show lower perceived astringency as lactic acid rounds tannin structure.

IDEAL OPERATING CONDITIONS

Alcohol tolerance: up to 15% - pH: > 3.15 - Temperature: 18–24 °C (64–75 °F).

RECOMMENDED WAY OF ADDITION

- For co-inoculation: add ~2 days after AF start.
- Remove from freezer 30 min before use and add directly to tank.
- Avoid large SO_2 additions around inoculation.

DOSAGE

Pre-dosed formats for:
- 2.5 hL, 25 hL, 250 hL, 1,000 hL (66, 660, 6,600 and 26,400 gal).

SHELF LIFE & STORAGE

- Two years with minimal loss of activity.
- Store frozen at –4 °C / –17 °C.

MALOLACT Acclimatée 4R

For big reds
& harsh ML conditions

ACTIVITY & APPLICATION SCOPE

MALOLACT Acclimatée 4R is a direct-add *Oenococcus oeni* culture specifically selected for wines with high alcohol, high phenolics and borderline pH. The strain remains active under strong tannin pressure (TPI ~80), providing robust implantation and secure completion of MLF in challenging matrices.

IDEAL OPERATING CONDITIONS

pH: ≥ 3.2 - Temperature: ~18 °C (64 °F) - Alcohol: up to 15% - Total SO_2: up to ~60 ppm.

RECOMMENDED WAY OF ADDITION

- Remove from freezer 30 min before use.
- Direct-add, no rehydration required.
- Prefer stable temperature and low oxygen exposure.

DOSAGE

Pre-dosed packets for:
- 2.5 hL, 25 hL, 250 hL, 1,000 hL (66, 660, 6,600 and 26,400 gal).

SHELF LIFE & STORAGE

- Two years with minimal loss of activity.
- Store frozen at –4 °C / –17 °C.

MALOLACT Acclimatée

Direct-add MLB for
standard conditions

ACTIVITY & APPLICATION SCOPE

MALOLACT Acclimatée is a ready-to-use *Oenococcus oeni* culture formulated for secure implantation without prior reactivation. It performs reliably in co-inoculation or sequential MLF, allowing smooth adaptation to ethanol while preserving varietal fruit and avoiding stress-derived off-notes.

IDEAL OPERATING CONDITIONS

- Moderate to warm fermentation temperatures.
- Low to moderate SO_2.
- Avoid temperatures above 30 °C (86 °F).

RECOMMENDED WAY OF ADDITION

- Remove from freezer 30 minutes prior to use.
- Direct-add to tank.
- For co-inoculation, wait until the end of yeast lag-phase.

DOSAGE

Pre-dosed packets for:
- 2.5 hL, 25 hL, 250 hL, 1,000 hL (66, 660, 6,600 and 26,400 gal).

SHELF LIFE & STORAGE

- Two years with minimal loss of activity.
- Store frozen at –4 °C / –17 °C.

MALOLACT Plantarum Uno

Lactobacillus plantarum
(co-inoculation specialist)

ACTIVITY & APPLICATION SCOPE

MALOLACT Plantarum Uno is a selected strain of *Lactobacillus plantarum*, ideal for co-inoculation in high-pH wines. It exhibits minimal acetic acid production from sugars and provides a broad enzymatic contribution (β-glucosidase, esterase, protease), enhancing aromatic release and long-term flavor integration. It also shows bacteriostatic activity, Ochratoxin A reduction (>50%), and strong antagonism toward *Brettanomyces* through rapid population dominance.

IDEAL OPERATING CONDITIONS

Temperature: 20–26 °C (68–80 °F) - SO_2 tolerance up to ~30 mg/L - Particularly suited to high-pH musts - Also useful for “raisined” grapes or low-SO_2 vinification.

RECOMMENDED WAY OF ADDITION

- If adding up to 30 ppm SO_2 → wait 24 h before inoculation.
- Prefer gentle 50/50 pre-suspension in must + chlorine-free water.
- Avoid temperatures below 20 °C or above 26 °C.

DOSAGE

Packets for 25 hL (660 gal).

SHELF LIFE & STORAGE

- Two years with minimal loss of activity.
- Store frozen at –4 °C / –17 °C.

Dedicated MLB nutrient

FERMOPLUS Malolactique 2.0

ACTIVITY & FUNCTION

FERMOPLUS Malolactique 2.0 supplies amino acids, vitamins and protective compounds that support: rehydration and implantation; stress tolerance (ethanol, temperature, SO_2); faster onset and completion of MLF; preservation of delicate aroma compounds via glutathione.
It improves survival and multiplication of *O. oeni*, reducing lag time and delivering more consistent MLF outcomes.

DOSAGE

200 ppm.

PACKAGING

5 kg bags.

USE

Add to the inoculation portion or tank prior to/at MLF start

STORAGE

Store cool and dry

PROPAGATION OPTION (COST-EFFICIENCY TECHNIQUE)

Direct-add cultures may also be propagated in a starter volume:

- draw ~100 L (26 gal) per 250 hL tank
- add 60 ppm FERMOPLUS Malolactique 2.0
- adjust pH to 3.5–4.0
- inoculate and hold at 24 °C (75 °F) for 24 h
- re-introduce into the full tank.

This increases viable population and accelerates MLF onset in difficult matrices.

Causes of stuck or sluggish malolactic fermentation

How to resolve them

Stuck or sluggish MLF is rarely caused by a single factor; more often it results from the **combined effect of microbial stressors** that limit implantation or **metabolic activity of lactic acid bacteria**. Common inhibitory conditions include low temperature, low NTU / nutrient-poor matrices, excessive SO_2, high alcohol, and low pH, as well as wines that have been heavily clarified or filtered prior to inoculation.

In many reductive wines there is also a strong electrostatic and colloidal imbalance (highly reduced redox state, unstable colloids, residual copper or sulfur complexes) that binds or adsorbs bacteria to lees or tank surfaces, preventing population growth even when viable cells are present. Under these conditions wines may present as “clean but inactive,” with MLF stalled despite apparently adequate cell counts.

Correction focuses first on removing stress and restoring a biologically favorable matrix. Raise temperature to 18–20 °C (64–68 °F), aerate gently if heavy reduction is present, and ensure free SO_2 is ≤ 10–12 mg/L at inoculation. If NTU is extremely low or the wine has been stripped of micronutrients, add a FERMOPLUS Malolactique nutrient or re-suspend a small lees fraction to provide adsorption surfaces and peptides. In strongly reduced / electrostatically unbalanced wines a brief rack–return with oxygen contact can relieve colloidal binding and release bacteria back into suspension. When restarting, prefer direct-add acclimated strains and prepare a small propagation starter in a warmer, higher-pH fraction of the same wine, then re-introduce to the full tank once active conversion is confirmed.

Malo-Lactic (ML) and Alcoholic (AF) Co-Fermentation (Co-Inoculation)

Rationale

- MLB inoculated after AF often face hostile conditions: high ethanol, low pH, low nutrients, reduced redox potential.
- Early inoculation (during AF) allows bacteria to gradually adapt to rising ethanol, implant before SO_2 and reductive stress accumulate, complete MLF faster and more reliably.

Benefits Observed

- Shorter total fermentation timeline (AF + MLF)
- Lower risk of spoilage organisms (Brett, heterofermenters)
- Reduced biogenic amine formation
- Better acid, alcohol and phenolic integration
- Fresher aromatic profile and improved mouthfeel.

Critical Control Points

Timing

- Inoculate MLB after yeast lag phase, not at yeast pitch
- If SO_2 was added at crush (≈50 mg/L), wait 6–8 hours before bacteria inoculation.

Temperature

- Ideal: 22–26 °C (72–79 °F)
- Avoid >30 °C (86 °F) > MLB inhibition.

Redox / Oxygen

- Slightly oxidative environment early in AF is acceptable
- Avoid reductive conditions that develop late in AF.

How to maximize diacetyl (buttery nuances) during MLF

Biochemical basis

Diacetyl originates from citric acid metabolism by *Oenococcus oeni* in an aerobic environment.
Pathway:

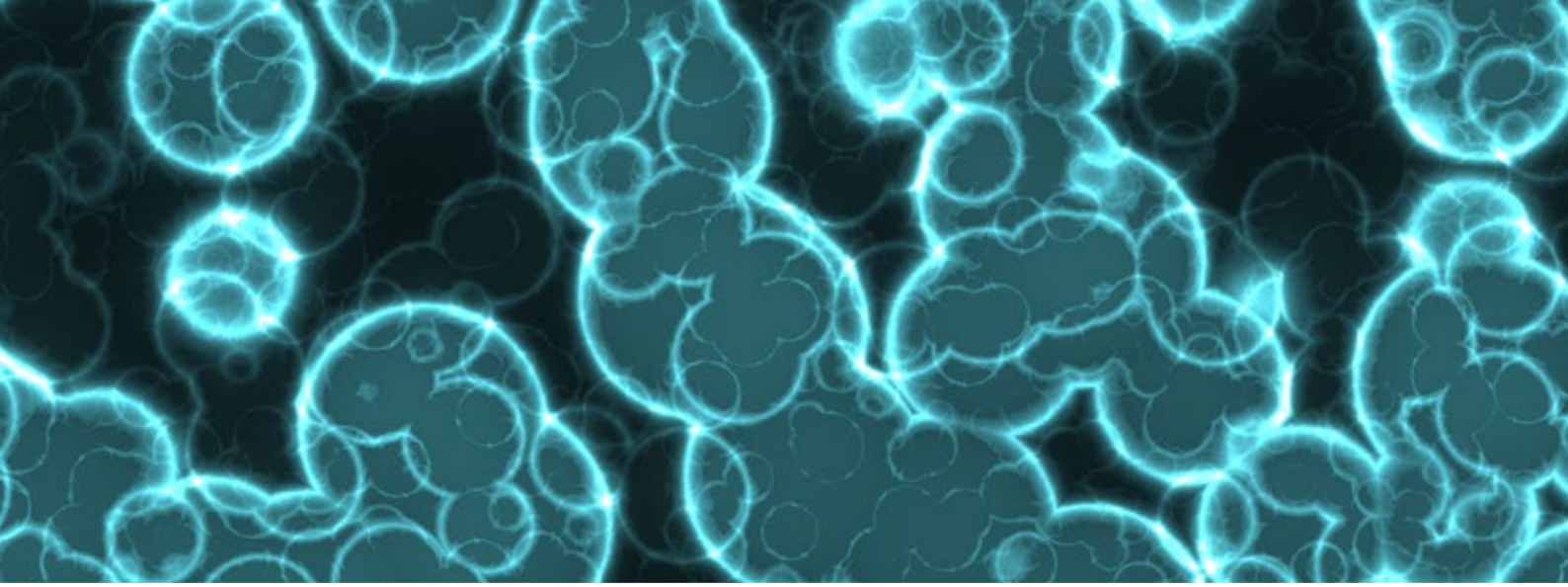
1. Citric acid → acetic acid + pyruvic acid
2. Pyruvic acid →
   - Diacetyl (oxidative pathway)
   - Acetoin / 2,3-butanediol (reductive pathway).

Conditions that increase diacetyl

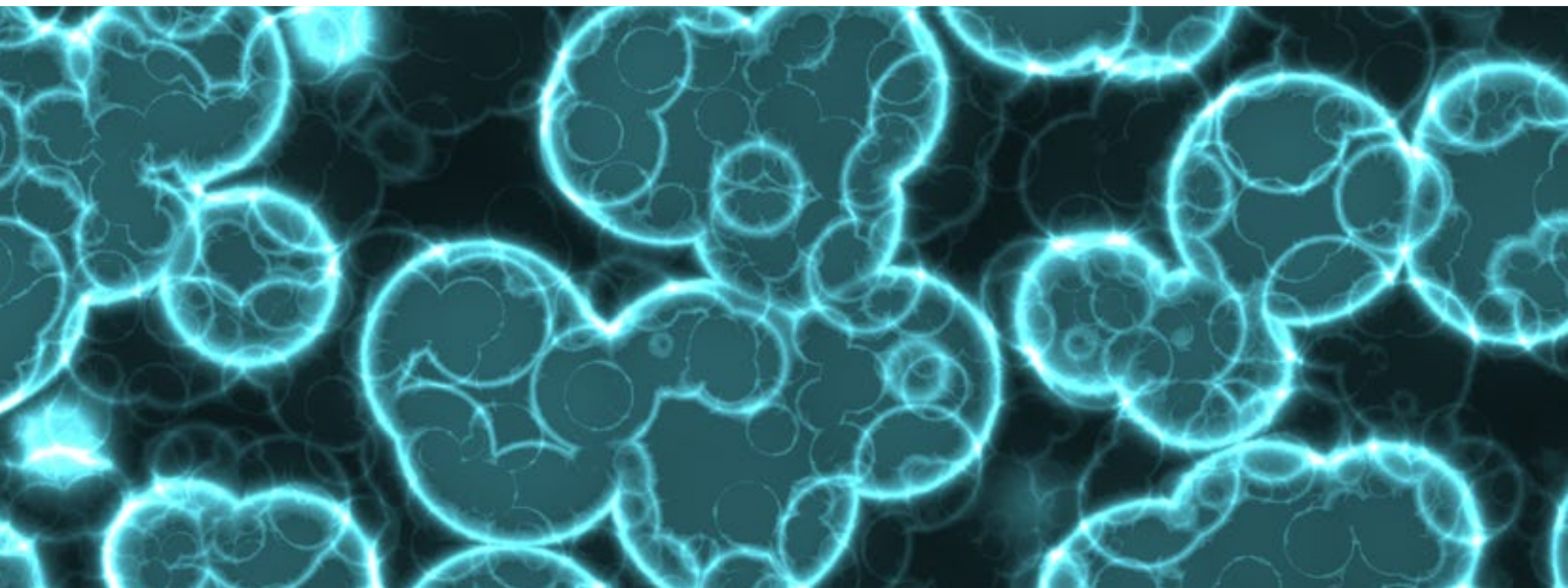
- Presence of citric acid
- Partially aerobic conditions
- Sequential MLF (not co-inoculated)
- Moderate MLF speed (≈2 weeks, not too fast)
- Limited lees contact
- Delayed SO_2 addition.

According to AEB research, adding ~1 g/L citric acid under partially aerobic conditions can double final diacetyl levels.


04



Enzymes



AEB ENDOZYM range

Enzymes are **essential process tools in modern winemaking**, allowing winemakers to guide **extraction, clarification, aroma release, and texture development with precision and consistency**. By selectively hydrolyzing grape and yeast cell-wall components—such as pectins, glucans, cellulose, and glycosidic aroma precursors—oenological enzymes improve juice yield, reduce viscosity, accelerate settling and flotation, enhance filtration, and unlock varietal aromatic potential that would otherwise remain bound.

The ENDOZYM range is built around targeted enzymatic activity, not generic pectin breakdown. Each formulation is designed for a specific technological objective and operating window, taking into account must composition, temperature, maceration regime, and downstream processing. From cold settling and flotation to red maceration, thermo-treated musts, thiol and terpene release, *Botrytis* management, sur-lies enhancement, and controlled stabulation, these enzymes allow wineries to achieve cleaner fermentations, better stability, and more expressive wines with fewer corrective interventions.

All ENDOZYM enzymes are produced from ***Aspergillus niger*** and formulated specifically for oenological use, with controlled secondary activities to ensure efficacy without sensory deviation. Used correctly, they contribute to **greater process efficiency, improved wine quality, and more sustainable cellar operations** by reducing energy demand, minimizing solids handling, and improving clarification and filtration performance across a wide range of vinification styles.

ENZYME NAME	PHYSICAL FORM (LIQUID / GRANULAR)	TYPICAL DOSAGE	IDEAL TEMPERATURE OF ACTIVITY	MAIN APPLICATION	KEY DISTINGUISHING CHARACTERISTIC
ENDOZYM Active	Granular	20–40 g/ton	15–25 °C (59–77 °F)	Must clarification / settling / flotation	Strong PL + PG activity; improves lees compactness and free-run yield
ENDOZYM Antibotrytis	Granular	30–50 g/ton (grapes) • 20–40 g/ton (wine basis)	15–25 °C (59–77 °F)	*Botrytis*-affected musts / glucan & laccase management	Targets *Botrytis* effects; supports filtration and color/ aroma preservation
ENDOZYM Cultivar	Granular	20–40 g/ton	10–20 °C (50–68 °F)	Cold maceration of aromatic whites / clarification	High β-glucosidase for terpene release during cold skin contact
ENDOZYM E-Flot	Liquid	5–10 mL/ton	10–25 °C (best ≥12 °C)	Flotation clarification	Fast liquid pectinase for rapid pre-fermentation flotation
ENDOZYM ICS 10 Éclair	Liquid	3–5 mL/ton	10–25 °C (50–77 °F)	Very fast must clarification / viscosity reduction	High-concentration (35,000 PLU/g) compact sediment formation
ENDOZYM Micro	Liquid	4–8 mL/ton	12–25 °C (54–77 °F)	Must clarification / free-run yield improvement	High PL content; concentrated liquid clarifier
ENDOZYM Ice	Liquid	2–6 mL/ton	8–15 °C (46–59 °F)	Cold-temperature settling of must	Cold-active enzyme effective in 'hairy zones' of pectin
ENDOZYM Glucalyse	Liquid	2–4 ppm	15–25 °C (59–77 °F)	β-glucan degradation / sur lies polysaccharide release	β-1,3 / β-1,6 glucanase; supports filtration & lees autolysis

ENZYME NAME	PHYSICAL FORM (LIQUID / GRANULAR)	TYPICAL DOSAGE	IDEAL TEMPERATURE OF ACTIVITY	MAIN APPLICATION	KEY DISTINGUISHING CHARACTERISTIC
ENDOZYM Muscat	Granular	20–40 g/ton	12–20 °C (54–68 °F)	Clarification of highly ramified aromatic varieties	Effective on ramified pectins and 'hairy spots' varieties
ENDOZYM Contact Pelliculaire	Granular	20–40 g/ton	18–28 °C (64–82 °F)	Skin contact color & tannin extraction	Cellulase/ hemicellulase secondaries for faster, softer extraction
ENDOZYM ICS 10 Rouge	Liquid	2–5 mL/ton	18–30 °C (64–86 °F)	Red maceration / color & structure extraction	Super-concentrated PL + cellulase; ideal for thick-skinned reds
ENDOZYM β-Split	Granular	20–50 ppm	15–25 °C	Aroma precursor hydrolysis (terpenes & norisoprenoids)	β-glucosidase system; best mid-/ post-fermentation
ENDOZYM Thiol	Liquid	20–40 mL/ton	12–18 °C (54–64 °F)	Thiol precursor release in thiolic varieties	Carbon–sulfur lyase promoting 4-MMP / 3-MH expression
ENDOZYM TMO	Liquid	20–40 ppm	15–25 °C (59–77 °F)	Clarification of thermo-/ flash-détente musts	Acts on thermally modified skin pectins & clogging polysaccharides
ENDOZYM Velluto	Liquid	10–40 mL/ton	15–25 °C (59–77 °F)	Polysaccharide / mannoprotein release (mouthfeel enhancement)	Arabinase-rich system increasing soluble polysaccharides & volume
LEES Must Plus THY	Liquid Kit (multiple enzymes)	Applied per kit to must volume (reference scale 800 hL-21,000 gallons)	6–10 °C (43–50 °F) during stabulation	Cold stabulation of must lees in thiol-driven varieties	Accelerated lees compound solubilization; includes Thiol enzyme for thiol-precursor enhancement
LEES Must Plus TRP	Liquid Kit (multiple enzymes)	Applied per kit to must volume (reference scale 800 hL-21,000 gallons)	6–10 °C (43–50 °F) during stabulation	Cold stabulation of must lees in terpene-driven varieties	Accelerated lees compound solubilization; includes β-Split for β-glucosidase terpene release

Unless otherwise noted:

- **Granular enzymes** should be stored cool and dry, ideally ≤15 °C (best stability 4–8 °C).
- **Liquid enzymes** should be stored refrigerated at 4–8 °C and protected from heat; do not freeze.

Most oenological pectinases show optimum reactivity between 15–40 °C, reduced activity below 10 °C, and progressive denaturation above ~45–50 °C.
Unless otherwise indicated, ENDOZYM products in this chapter are processing aids compliant with TTB 27 CFR § 24.246 for use in U.S. winemaking.

Must clarification & flotation enzymes

These enzymes act primarily on grape pectins to:

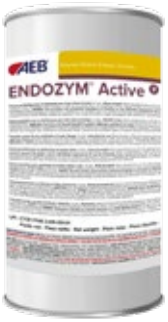
- reduce viscosity
- accelerate settling and flotation
- increase free-run yields
- produce compact, easily separable lees.

They are used mainly in white and rosé musts and are selected according to:

- clarification method (static settling / flotation)
- must temperature and pectin load
- *Botrytis* / glucan presence.

ENDOZYM Active

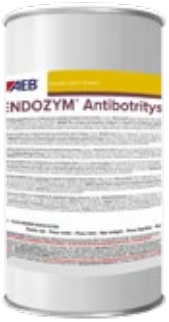
Must clarification (granular)



PURPOSE	General must clarification and rapid pectin breakdown prior to settling or flotation, with a focus on improving free-run juice yield and lees compactness.
CHARACTERISTICS	Granular pectinase with marked pectinlyase and polygalacturonase activities. It hydrolyzes pectic chains, facilitates juice drainage from pomace and significantly speeds up clarification of musts and wines. Cleaner musts show fewer unstable proteins, easier filtration and cleaner aromatic expression.
DOSAGE	20–40 g/ton (≈ 2–4 g/hL), depending on contact time, temperature and SO_2 level. Higher dose for colder musts, high pectin, or higher SO_2.
ADDITION	Dissolve in 20–30 parts of non-sulfurized must or demineralized water and add to must or directly onto grapes (receiving line or press). Avoid direct contact with high SO_2 or bentonite doses. Activity is strongly reduced under about 12 °C (54 °F).
IDEAL TEMPERATURE	15–25 °C (effective from ~12–35 °C with slower kinetics at the low end).
FORM / STORAGE	Granular. Stable at room temperature for at least 2 years, with <5 % loss of activity per year starting from the third year; best stored cool and dry (≤15 °C, ideally 4–8 °C). 500 g vacuum-sealed cans.

ENDOZYM Antibotrytis

Laccase / glucan management (granular)



PURPOSE

Treatment of musts and wines affected by *Botrytis cinerea*, laccase and *Botrytis*-derived glucans, to improve filterability and preserve color and aroma.

CHARACTERISTICS

Purified enzymatic preparation with activities that help neutralize the effects of *Botrytis*: it indirectly acts on polyphenol oxidases (tyrosinase–laccase), preserving color and aromatic precursors, and contributes to pectin/glucan hydrolysis so as to prevent filter clogging and viscosity problems. It is particularly decisive in musts heavily attacked by mold, where SO_2 or standard technology is insufficient.

DOSAGE

30–50 g/ton of grapes or 20–40 g/hL of wine (≈ 1.5–3 lb/1,000 gal), with higher dosages recommended for high *Botrytis* load, low temperatures and/or high sugar.

ADDITION

Dissolve in 20–30 parts of non-sulfurized must or demineralized water and add to must or wine. Often used in combination with a standard clarification or color-extraction enzyme to complete pectin breakdown.

IDEAL TEMPERATURE

15–25 °C.

REDUCED / INACTIVE

Less effective at low temperatures (<10–12 °C) or very high sugar.

FORM / STORAGE

Granular. Stable at room temperature for at least 2 years, with <5 % loss per year from the third year; store cool and dry. 500 g vacuum-sealed cans.

ENDOZYM Cultivar

Aromatic white varieties / cold maceration (granular)

PURPOSE

Clarification and cold maceration of aromatic white grapes, combining yield, settling and terpene release.

CHARACTERISTICS

Granular enzyme for cold maceration and must clarification. It weakens pulp cell walls, facilitates aroma extraction and has very high β-glucosidase activity to release terpenes from their sugar moieties. PL and PG activity are comparable to must-settling pectinases, so it also contributes to drainage and yield.

DOSAGE

20–40 g/ton (≈ 2–4 g/hL), depending on temperature, contact time and SO_2 content.

ADDITION

Dissolve in 20–30 parts of non-sulfurized must or demineralized water and add directly onto the grapes going to the press, or into the receiving line. Ideal when crushed grapes are held at 5–8 °C (40–46 °F) for ~24 h. Because low temperatures reduce activity, earlier addition (on truck/gondola or receiving line) is recommended to maximize contact time before chilling. Avoid contact with high SO_2 or bentonite.

IDEAL TEMPERATURE

10–20 °C (used in cold-maceration regimes with long contact).

REDUCED / INACTIVE

Strongly slowed at typical cold-maceration temperatures (5–8 °C) if contact time is short; inactive above ~45 °C.

FORM / STORAGE

Granular. Stable at room temperature for at least 2 years, with <5 % loss per year from the third year; store cool and dry. 500 g vacuum-sealed cans.

ENDOZYM E-Flot

Flotation clarification (liquid)

PURPOSE

Liquid pectinase for must clarification through flotation or cold settling, ensuring rapid de-pectinization so the must can be floated before fermentation starts.
Also polygalacturonic fractions are small enough so settling is limited and flotation facilitated.

For flotation, it is important that:
- fermentation has not started
- must temperature stays above ~12 °C (55 °F)
- pectin is thoroughly degraded before entering the flotation unit.

DOSAGE

5–10 mL/ton (≈ 0.5–1 mL/hL), with higher dosages for:
- low temperature
- musts with high pectin / suspended solids
- pH < 3.2.

ADDITION

Dilute in 20–30 parts non-sulfurized must or demineralized water and add to must or directly onto grapes (crushed-grape line or press). Lower temperatures reduce activity. Avoid contact with high SO_2 or bentonite levels.

IDEAL TEMPERATURE

10–25 °C, with best performance ≥12 °C.

REDUCED / INACTIVE

Slow <8–10 °C; reduced efficacy >35–40 °C.

FORM / STORAGE

Liquid. Store at ~5 °C / 40 °F (refrigerated) for up to 24 months in original packaging; do not freeze. Supplied in 10 and 25 kg pails.

ENDOZYM ICS 10 Éclair

High-concentration liquid clarifier (liquid)

PURPOSE

High-concentration liquid pectinase for very fast must clarification, viscosity reduction and sediment compaction — especially where storage space for enzyme is limited.

CHARACTERISTICS

Contains 35,000 Pectin lyase units per gram, giving clarification activity significantly greater than most standard enzymes. It rapidly breaks grape pectin chains, reducing viscosity and accelerating sedimentation; free-run juice yields are increased and lees become more compact. High concentration improves shelf life and makes the product easy to store in small, refrigerated space.

DOSAGE

3–5 mL/ton maintaining similar dosing for grapes and juices (for juice use, the same dosage as for grapes is suggested to compensate shorter contact time and lower temperature).

ADDITION

Dilute in 20–30 parts non-sulfurized must or demineralized water and add to must or directly onto grapes. If grapes are rich in phenolics, adding at press discharge is recommended to reduce extraction from skins and stems.

IDEAL TEMPERATURE

Approx. 10–25 °C for must clarification.

REDUCED / INACTIVE

Slower <10 °C; reduced stability above ~35–40 °C.

FORM / STORAGE

Liquid. Store at 5 °C / 40 °F for up to 24 months. Packaging: 250 mL and 1 kg plastic bottles.

ENDOZYM Ice

Cold-active pectinase (liquid)

PURPOSE	Extra-rapid liquid pectinase for must settling at low temperature, maintaining high activity despite cold, low pH or SO_2.
CHARACTERISTICS	Developed on a solid media, enriched in secondary activities able to process the most intricate pectin structures in the “hairy zones.” This gives very fast de-pectinization even under limiting conditions (cold, low pH, SO_2).
DOSAGE	2–6 mL/ton, use higher end for musts with high pectin and suspended solids or more challenging vinification conditions.
ADDITION	Dilute in 20–30 parts non-sulfurized must or demineralized water and add to must or directly onto grapes. Activity is less hindered than standard pectinases under cold conditions but still increases with temperature and contact time.
IDEAL TEMPERATURE	8–15 °C.
REDUCED / INACTIVE	Limited activity <6–8 °C; denaturation risk above ~35–40 °C.
FORM / STORAGE	Liquid. Store at 5 °C / 40 °F for up to 24 months. Supplied in 1 kg plastic bottles.

Glucanase for Enhanced Clarification and Filtration

ENDOZYM Glucalyse

β-glucan degradation

PURPOSE	Hydrolysis of clogging β-glucans (β-1,3 and β-1,6) in musts and wines—especially those affected by *Botrytis* and support for sur lies ageing by acting on yeast cell walls.
CHARACTERISTICS	Highly concentrated pectolytic preparation with β-1,3 and β-1,6 glucanase activities, formulated for complete hydrolysis of β-glucans that impair clarification and filtration. It is also ideal during sur lies rest, facilitating yeast lysis and releasing polysaccharides, improving body, aromatic persistence, protein stability and color stability. The enzyme is purified to remove undesirable activities such as cinnamyl esterase (CE), thereby reducing the risk of volatile phenol defects.
DOSAGE	Typically 2–4 g/hL (≈ 20–40 g/ton) for *Botrytis*-related issues; dose according to glucan load and contact time.
ADDITION	Add to must or wine (preferably from the first racking, when temperatures are more favorable), diluted in non-sulfurized must or demineralized water. For sur lies use, apply on lees-aged wines to promote polysaccharide release.
IDEAL TEMPERATURE	15–25 °C (warmer end preferred for sur lies / glucan hydrolysis).
REDUCED / INACTIVE	Reduced efficiency <10–12 °C; unstable >45 °C.
FORM / STORAGE	Liquid. Store at 5 °C / 40 °F for up to 24 months; do not freeze. Packaging: 1 kg plastic bottles.

ENDOZYM Muscat

Aromatic must clarification (granular)

PURPOSE	Clarification and flotation of “hard-to-clarify” aromatic varieties such as Muscat, Gewürztraminer, Malvasia and Müller-Thurgau, which are rich in ramified pectins.
CHARACTERISTICS	Granular pectinase specifically adapted to grapes with high content of ramified pectin and “hairy spots” on the pectin chain, which are harder to degrade. Secondary activities (Arabinase, Rhamnosidase) are key to rapidly removing pectin in these challenging varieties. These activities are encoded in the *Aspergillus niger* DNA and expressed in the solid-phase fermentation used in AEB’s Paris plant.
DOSAGE	20–40 g/ton (≈ 2–4 g/hL), adjusted for temperature, contact time and SO_2 content.
ADDITION	Dissolve in 20–30 parts non-sulfurized must or demineralized water and add to must or directly onto grapes (receiving line). Lower temperatures reduce activity; early addition ensures adequate contact before refrigeration. Avoid high SO_2 and bentonite contact.
IDEAL TEMPERATURE	12–20 °C.
REDUCED / INACTIVE	Strongly slowed <10 °C.
FORM / STORAGE	Granular. Stable at room temperature for at least 2 years, with <5 % annual loss after the third year; store cool and dry. 500 g vacuum-sealed cans.

Color & maceration extraction enzymes

These enzymes are designed for **red vinification and controlled skin contact**. They:

- promote fast and complete color extraction
- assist tannin and polysaccharide release
- improve permeability of pomace and diffusion of phenolics
- help build structure and mid-palate without over-extracting seed tannins.

Extraction intensity is tuned via dosage, temperature, maceration time and pump-over pattern.

ENDOZYM Contact Pelliculaire

Skin contact extraction (granular)

PURPOSE	Granular maceration enzyme for color and tannin extraction in red and rosé production, especially where shorter maceration is desired.
CHARACTERISTICS	Pectolytic enzyme pool with natural cellulase and hemicellulase secondary activities. It speeds up color extraction, reduces maceration time, and helps avoid extraction of harsh and bitter tannins.
DOSAGE	20–40 g/ton (≈ 2–4 g/hL), adjusted for pH, temperature and SO_2 content. Lower pH, low temperature and higher sulfur require the upper range.
ADDITION	Dilute in 20–30 parts non-sulfurized must or demineralized water and add at first pump-over or directly onto grapes at filling. Optimal temperature is above 18 °C (60 °F) for red maceration.
FORM / STORAGE	Granular. Stable at room temperature for at least 2 years, with <5 % annual loss after year three; store cool and dry. 500 g vacuum-sealed cans.

ENDOZYM ICS 10 Rouge

Red maceration (liquid)

PURPOSE

Liquid maceration and color-extraction enzyme for **structured red wines**, especially from thick-skinned varieties.

CHARACTERISTICS

Super-concentrated liquid product containing 20,000 Pectinlyase units. Secondary cellulase, polygalacturonase and hemicellulase activities help penetrate cell walls and enable rapid color and phenolic extraction. Wines made with ICS 10 Rouge show greater structure and complexity. Pomace is more permeable, increasing both the quality and quantity of free-run juice. High PL content also reduces must viscosity and speeds sedimentation.

DOSAGE

2–5 mL/ton. Use higher doses for low pH grapes and vintages with difficult color extraction.

ADDITION

Because enzymes are inactivated by tannins and alcohol, application is recommended at the first pump-over, just before fermentation starts, when the temperature is above 18 °C (60 °F). Dilute in 20–30 parts non-sulfurized must or demineralized water, then distribute via a pump-over.

IDEAL TEMPERATURE

18–30 °C.

FORM / STORAGE

Liquid. Store at 5 °C / 40 °F for up to 24 months; do not freeze. Packaging: 250 mL and 1 kg plastic bottles.

Special & targeted application enzymes

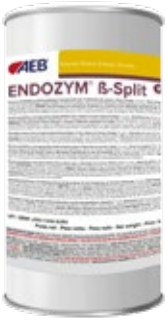
These preparations are chosen for **specific technological goals**, such as:

- thiol precursor release
- glycosidic aroma hydrolysis
- clarification of thermo-treated musts
- release of polysaccharides from lees.

They are used in particular vinification styles or when specific issues (e.g., glucans, sur lies enhancement) need to be addressed.

ENDOZYM β-Split

Aroma precursor release (granular)



PURPOSE	Granulated β-glucosidase for the release of terpenic and C13-norisoprenoid aromas from glycosylated precursors in white and red wines.
CHARACTERISTICS	Catalyzes hydrolysis of glycosidic bonds, releasing aromatic molecules. Suppressed by glucose, so it is best used mid-fermentation or on finished wines before bentonite. It can cleave aromatics not only from β-glucosides but also from pentose-linked (non-fermentable) sugars. Its action may be stopped by light fining with BENTOGRAN (3–10 g/hL).
DOSAGE	20–50 ppm (≈ 2–5 g/hL, or ⅓–½ lb/1,000 gal), depending on contact time, temperature and SO_2. Activity is reduced by high sugar and low temperature, and dosages must be increased accordingly.
ADDITION	Dissolve in 20–30 parts non-sulfurized must or demineralized water and add to wine. Often used near the end of fermentation or in finished wines to improve aroma expression. Avoid contact with high SO_2 or bentonite until the desired aromatics are obtained; in white/rosé, BENTOGRAN can be used afterward to neutralize residual activity.
IDEAL TEMPERATURE	15–25 °C.
REDUCED / INACTIVE	Low efficiency at low temperature and/or high sugar; unstable above ~45 °C.
FORM / STORAGE	Granular. Stable at room temperature for at least 2 years, with <5 % annual loss thereafter; store cool and dry. 500 g vacuum-sealed cans.

ENDOZYM Thiol

Thiol precursor release (liquid)

PURPOSE	Liquid carbon–sulfur lyase to favor hydrolysis of thiol precursors and enhance thiol expression in Sauvignon Blanc, Riesling, Gewürztraminer and other thiol-driven varieties.
CHARACTERISTICS	Promotes conversion of Cys-4-MMP and Cys-3-MH into volatile thiols 4-MMP (box-tree character) and 3-MH (grapefruit), enhancing the varietal bouquet.
DOSAGE	20–40 mL/ton (≈ 20–40 ppm or about ⅓ lb/1,000 gal), adjusted for contact time, temperature and SO_2.
ADDITION	Add to the fermenting tank midway through fermentation to avoid glucose suppression and allow good integration into the aromatic profile. Use protective tools such as ELEVAGE Glu if oxidation risk is present.
IDEAL TEMPERATURE	12–18 °C.
REDUCED / INACTIVE	Low activity <10 °C; reduced efficiency >30–35 °C.
FORM / STORAGE	Liquid. Store at 5 °C / 40 °F for up to 24 months. Packaging: 1 L bottles.

ENDOZYM TMO

Thermo / flash-détente clarification (liquid)

PURPOSE	Liquid pool of enzymatic activities for clarification of heat-extracted musts from thermo-vinification or flash-détente, where thermally modified pectins and skin-derived polysaccharides interfere with brightness and filtration.
CHARACTERISTICS	Displays strong secondary activities able to act on skin pectic chains that have become particularly hard to degrade after heating. Ideal to remove clogging polysaccharides, improve must clarity and prevent filtration problems.
DOSAGE	20–40 ppm (≈ 2–4 g/hL or 20–40 g/ton), depending on thermo-treatment severity and polysaccharide load.
ADDITION	Dilute in 20–30 parts of non-sulfurized must or demineralized water. Use immediately after thermal treatment, once temperature has dropped below 40 °C (104 °F).
IDEAL TEMPERATURE	15–25 °C, after the must has cooled below 40 °C.
REDUCED / INACTIVE	Slow <10 °C; unstable above ~40 °C.
FORM / STORAGE	Liquid. Can be kept for 2 years in the original sealed packaging at temperatures below 10 °C. Packaging: 1 kg bottles and 10 kg pails.

ENDOZYM Velluto

Polysaccharide / mouthfeel enhancement (liquid)

PURPOSE	Increase soluble polysaccharide content and soften mid-palate, enhancing volume and mouthfeel.
CHARACTERISTICS	Liquid pectinase–arabinase system acting on skin and lees polysaccharides, favoring the release of mannoproteins and other macromolecules associated with roundness and length.
DOSAGE	1–4 mL/hL (≈ 10–40 mL/ton), depending on style and desired mouthfeel impact.
ADDITION	Use during red maceration or on fine lees in white and rosé wines to enhance texture and volume.
IDEAL TEMPERATURE	15–25 °C.
FORM / STORAGE	Liquid. Refrigerate 4–8 °C; do not freeze.

LEES Must Plus line

Enzymatic kits for cold stabulation on must lees

Stabulation (*stabulation sur bourbes*) is a **pre-fermentation technique** in which freshly pressed, turbid must is kept in contact with its fine press lees at low temperature for several days, with regular resuspension. The lees fraction contains mannoproteins, peptides, polysaccharides, amino acids and antioxidant compounds that bind and retain aromatic precursors.

Controlled stabulation:

- increases mouthfeel precursors and mid-palate weight
- enhances aromatic finesse, persistence and complexity
- improves colloidal balance and protein stability
- provides natural oxidative protection during early processing.

The **LEES Must Plus** kits are designed to standardize and accelerate these benefits by supplying the key enzymatic activities that would normally develop slowly in the lees, allowing wineries to achieve the effect of a long stabulation in a shorter, controlled timeframe at low temperature.

Products in the range

LEES Must Plus THY

For varieties with a thiol-driven aromatic profile (includes ENDOZYM Thiol to promote thiol-precursor transformation).

LEES Must Plus TRP

For terpenic / glycosylated-precursor varieties (includes ENDOZYM β-Split for β-glucosidase-driven terpene release).

Practical application
Stabulation protocol

1 Immediate post-press handling

Target matrix
- Apply directly to juice containing gross/fine lees immediately after pressing.

Enzyme kit addition
- Dilute each component in ~10 parts of unsulfited must or demineralized water.
- Add progressively during tank filling to ensure homogeneous dispersion.

Transfer to stabulation tank
- Store must at ≈ 8 °C
- Recommended duration: 2–3 days.

Lees management
- Perform periodic resuspension (daily or twice daily)
- Prevent compaction and reductive pockets.

2 Biochemical action during cold contact

During the controlled stabulation phase:
- mannoproteins & peptides are gradually solubilized
- polysaccharides & colloids are partially depolymerized
- antioxidant compounds are released from lees
- aromatic precursors become more available for fermentation conversion.

Resulting benefits:
- enhanced mouthfeel precursors & volume
- finer aromatic expression and persistence
- improved colloidal stability
- better protection from oxidative drift.

(Compared with conventional stabulation, the enzyme kit allows these effects to develop more rapidly and consistently at 6–8 °C.)

3 Post-stabulation clarification & fermentation

- Clarification step
  After 2–3 days, the must is clarified (static settling or flotation).
- Separation of enriched fraction
  The clarified, enriched juice is sent to fermentation.
- Downstream effect during fermentation.

The compounds extracted from lees:
- support fermentation regularity and yeast nutrition dynamics
- enhance texture integration
- contribute to the final sensory profile of the wine.

Operational Notes & Good Practices
- Use only sound grapes and fine press lees (remove very coarse solids first).
- Maintain temperature low enough to prevent fermentation during contact.
- Ensure regular homogenization of lees throughout stabulation.
- Avoid excessive SO_2 or early bentonite additions that may inhibit enzyme activity.
- Clarification tank volumes should account for the higher lees fraction created.


05

Polysaccharides & Colloids

Polysaccharides & Colloids
Product Summary

Polysaccharides are one of the **"quiet engines" of wine quality**. They sit in the background of the matrix, but they have a disproportionate impact on stability, mouthfeel and longevity. Naturally produced during fermentation and ageing, and supplemented through specific cellar products, wine polysaccharides include grape-derived arabinogalactans and rhamnogalacturonans and yeast-derived mannoproteins, typically in the 0–2 g/L range and remaining stable even after many years in bottle.

From a winemaking perspective, two families are particularly useful as tools:
- **gum Arabic (Acacia)**–based products.
- **yeast mannoproteins** and mannoprotein-rich yeast derivatives

Both act as protective colloids: large, branched molecules that surround and "coat" reactive particles (tartrate crystals, proteins, phenolic micelles), slowing aggregation and precipitation.

PRODUCT NAME	PRODUCT TYPE / COMPOSITION	SCOPE OF APPLICATION	DOSAGE (PPM)
ARABINOL	Dextrorotatory liquid gum arabic (protective colloid)	Finishing – colloidal protection, smoothing and stabilization in white, rosé and red wines	200–1500 ppm
ARABINOL Arôme	Blend of dextrorotatory and levorotatory gum arabic	Aromatic whites and rosé; young reds with fragile aromas and pigments	200–2000 ppm
ARABINOL Dolce	Dextrorotatory gum arabic designed for smoothness and sweetness perception	High-alcohol reds and full-bodied whites; softness without sugar; suitable also for low-/no-alcohol wines	200–1500 ppm
ARABINOL HC	High-concentration dextrorotatory gum arabic (≈33%)	Export wines and filtration-sensitive wines; strong colloidal shield and long-term stability	200–1500 ppm
ARABINOL Super Rouge	Levorotatory, high-viscosity gum arabic	Young red wines; pigment stabilization, color protection and tannin smoothing	200–1400 ppm
BÂTONNAGE Plus Élevage	Yeast-derived mannoproteins and peptides with antioxidant fraction	Élevage and oxidative protection; rebuilding volume and mid-palate	100–300 ppm
BÂTONNAGE Plus Structure	Mannoproteins, oak tannin fractions and levorotatory gum arabic	Structurally lean red wines; tannin integration and aromatic harmony	100–300 ppm
BÂTONNAGE Plus Texture	Early-stage mannoprotein and peptide complex	Early fermentation and musts; support mouthfeel development from the start	100–300 ppm
ELEVAGE Glu	Yeast derivative enriched in glutathione precursors	Oxidation-sensitive white and rosé wines; preservation of freshness and aroma	100–300 ppm
SUPER-MANN	Pure mannoprotein extract	Final finishing; tartrate stability support and texture integration	100–300 ppm

Colloidal protection and physical stability

Polysaccharides modulate the way charged particles interact in wine. By adsorbing onto tartrate nuclei, metal–protein complexes or phenolic colloids, they create steric and electrostatic barriers that **delay or prevent crystal growth and haze formation**. Recent work on red-wine colloids and protein–polysaccharide interactions confirms that polysaccharides can shift zeta potential, change colloidal particle size and reduce protein haze, **without negatively affecting color or phenolic composition** *(Olivia Burken & Stephan Sommer J Food Sci 2024).*

For winemakers, this translates into:

- **improved tartrate stability** (especially when gum Arabic is combined with metatartaric acid or cold stabilization)
- fewer surprises from late protein or metal casse
- wines that remain **visually and physically stable** during shipping and shelf life.

Gum Arabic–based products such as the **ARABINOL line** exploit these properties: their long, highly branched chains act as strong protective colloids, slowing tartrate aggregation and helping keep color and colloids in suspension.

Mouthfeel, mid-palate and aromatic persistence

Beyond stability, polysaccharides make wines feel different. Because they increase viscosity at very low concentration and interact with tannins and proteins on the palate, they can:

- **soften astringency** and smooth rough tannins
- **reduce bitterness** from flavones or oxidized phenolics
- **increase perceived body**, roundness and mid-palate weight
- **extend flavor persistence** in the finish.

Mannoproteins are particularly effective here. Reviews and recent sensory studies show that mannoprotein additions can **increase viscosity, fullness and "creaminess"**, while modulating the perception of acidity and tannin. Products such as SUPER-MANN and the BÂTONNAGE Plus range mimic or intensify what extended sur-lie ageing would naturally provide: a thicker, more integrated mouthfeel, finer bubbles in sparkling wines, and a more cohesive, layered mid-palate.

Antioxidant and protective effects

Yeast-derived polysaccharides and cell-wall fractions are increasingly recognized as true **antioxidant tools**. Several studies on yeast derivatives show:

- measurable radical-scavenging activity in model wine
- lower oxygen consumption rates when SO_2 is reduced or absent
- reduced formation of acetaldehyde
- better preservation of glutathione and other endogenous antioxidants
- less browning and fewer oxidative off-odors over time. These effects are attributed to a combination of mannoproteins, peptides, amino acids (e.g., cysteine, methionine) and small antioxidants trapped within yeast derivatives. In practice, mannoprotein-rich preparations such as BÂTONNAGE Plus Texture / Élevage / Structure and SUPER-MANN can extend the protective envelope normally provided by SO_2, especially in whites and rosés where color and aroma are highly oxidation-sensitive.

Gum Arabic does not have the same intrinsic redox activity, but by shielding phenolic colloids from aggregation and limiting metal–phenolic interactions, it **indirectly helps reduce oxidative cascades and maintain freshness**, particularly in young reds and aromatic whites.

Color, foam and integration with other technologies

Polysaccharides also interact with pigments and CO_2 in ways that matter commercially:

- certain mannoproteins and gum Arabic fractions help stabilize red color, both by protecting anthocyanin-containing colloids and by reducing the loss of pigmented polymers to fining or precipitation
- in sparkling wines, mannoproteins in particular improve foam properties: smaller, more persistent bubbles and a more stable mousse, through protein–CO_2 interactions.

Because of this **multi-functionality**, polysaccharides integrate well with other cellar operations:

- after cold stabilization or contact with CMC / potassium bitartrate, gum Arabic can “re-smooth” the wine and reinforce colloidal protection
- after fining or aggressive filtration, mannoprotein products can rebuild mid-palate and buffer the impact of necessary treatments
- in low-SO_2 or “reductive” white programs, mannoproteins and yeast-cell-wall preparations can be used proactively as oxygen-management tools, complementing glutathione-rich lees management.

Acacia (Gum Arabic) products

ARABINOL

PRODUCT PROFILE	ARABINOL is a dextrorotatory liquid gum arabic solution designed to reinforce the natural colloidal balance of wine at the end of storage. Its polysaccharide matrix acts as a protective colloid, coating tartrate nuclei, protein–metal complexes and unstable phenolic colloids. Wines treated with ARABINOL show greater resistance to precipitation, improved visual stability and a smoother, more continuous palate profile. Beyond stabilization, ARABINOL subtly increases perceived viscosity and mid-palate volume, rounding bitterness and softening angular tannins, particularly beneficial in dry whites, rosé and young reds where structure can feel sharp or fragmented.
RECOMMENDED APPLICATION	Ideal for white, rosé and red wines approaching bottling, especially those destined for transport or warm-chain distribution where colloidal resilience is essential. ARABINOL provides final softening, integration and stability insurance without altering residual sugar.
WAY OF APPLICATION	• Add after clarification / fining / stabilization. • Pre-dilute with 10 parts wine. • Homogenize thoroughly in tank.
DOSAGE	200–1500 ppm (0.2–1.5 g/L).
PACKAGING	1 kg bottle, 10 kg & 25 kg pails, 230 kg drums.
STORAGE & SHELF LIFE	2 years in sealed original container. Store cool, dry, odor-free, protected from light.

ARABINOL Arôme

PRODUCT PROFILE	ARABINOL Arôme combines dextrorotatory and levorotatory gum Arabic fractions selected for their ability to preserve aromatic freshness and support chromatic stability in delicate wines. Its steric protection limits tartrate and protein aggregation, while its affinity for pigment-bearing colloids helps maintain brightness in young reds. On the palate, ARABINOL Arôme delivers a fine smoothing effect: phenolic edges are softened, persistence is extended and aromatic lift feels more precise and expressive.
RECOMMENDED APPLICATION	Particularly suited to aromatic whites and rosé, as well as youthful reds with fragile pigments or wines exposed to transport and temperature variation, helping protect both sensory harmony and visual stability.
WAY OF APPLICATION	Use after finishing / stabilization, pre-dilute 1:10, mix gently and homogenize.
DOSAGE	200–2000 ppm.
PACKAGING	1 kg bottle, 10 kg & 25 kg pails, 230 kg drums.
STORAGE & SHELF LIFE	2 years sealed, cool, protected from light.

ARABINOL Dolce

PRODUCT PROFILE	ARABINOL Dolce was developed for wines requiring roundness and length without concentrate additions or residual sugar. Its dextrorotatory gum Arabic structure increases palate coating and perceived sweetness while preserving dryness, reducing alcohol “heat” and bringing silkiness to otherwise firm textures. Rather than adding weight, it contributes tactile smoothness, continuity and length, making it especially effective in powerful reds and full-bodied whites.
RECOMMENDED APPLICATION	Best suited for high-alcohol reds and structured whites where the goal is to soften edges, enrich the mid-palate and harmonize ethanol perception while maintaining balance and definition. Also used to soften the edges of non-alcoholic wines.
WAY OF APPLICATION	Apply post-fining and stabilization, pre-dilute 1:10 in wine, mix and homogenize thoroughly.
DOSAGE	200–1500 ppm.
PACKAGING	20 kg pails.
STORAGE & SHELF LIFE	2 years sealed, cool and dry.

ARABINOL HC

PRODUCT PROFILE	ARABINOL HC is a high-concentration gum Arabic solution produced from a higher-viscosity raw material to provide a particularly dense colloidal shield. It is especially suitable for wines that are filtration-sensitive or prone to latent instabilities that may develop after bottling. Sensory-wise, ARABINOL HC reinforces structural cohesion, binding phenolic and acid components into a more compact and unified palate.
RECOMMENDED APPLICATION	Recommended for wines destined for export or extended logistics, and for cuvées requiring enhanced insurance against post-bottling precipitation or filtration stress.
WAY OF APPLICATION	Apply after stabilization / filtration, dilute 1:10 before dosing, mix and homogenize completely.
DOSAGE	200–1500 ppm.
PACKAGING	1 kg bottle, 25 kg pails.
STORAGE & SHELF LIFE	2 years sealed, cool, dry, protected from light.

ARABINOL Super Rouge

PRODUCT PROFILE	ARABINOL Super Rouge is a highly viscous levorotatory gum Arabic designed to support the stability of anthocyanin-derived pigments in young red wines. By enveloping pigment-rich colloids, it helps maintain color depth and reduce the loss of colored polymers during ageing and transport. Its strong colloidal action also softens tannin perception, giving greater roundness and harmony to early drinking reds.
RECOMMENDED APPLICATION	Indicated for young reds, pigment-fragile varieties and wines exposed to oxidative or logistic stress, where color retention and palate smoothing are strategic quality objectives.
WAY OF APPLICATION	Apply after fining / finishing, dilute 1:10 prior to addition, homogenize thoroughly.
DOSAGE	200–1400 ppm.
PACKAGING	25 kg pails.
STORAGE & SHELF LIFE	2 years sealed, cool and dark.

Yeast-derived polysaccharides

Mannoprotein & peptide systems

BÂTONNAGE Plus Élevage

PRODUCT PROFILE	BÂTONNAGE Plus Élevage is a mannoprotein-rich yeast derivative developed to replicate the protective and textural effects of extended sur-lie ageing in a controlled manner. Its peptide and antioxidant fractions help maintain a favorable redox environment, limiting oxidative drift while progressively building creaminess, volume and palate cohesion. Ideal for low SO_2 wines. It is particularly effective in wines that are sensitive to oxidation or that have undergone intensive processing, restoring balance, softness and structural integration.
WAY OF APPLICATION	Pre-hydrate in 10 parts wine or warm water, allow ~1 hour for full dispersion, add via pump-over or Venturi.
DOSAGE	100–300 ppm (≈ 1–2.5 lb / 1,000 gal).
PACKAGING	5 kg bags.
STORAGE & SHELF LIFE	2 years sealed, cool, dry, odor-free.

BÂTONNAGE Plus Structure

PRODUCT PROFILE	BÂTONNAGE Plus Structure combines mannoproteins, oak-derived tannin components and levorotatory gum Arabic to enhance mouthfeel in structurally lean reds. It harmonizes herbaceous or green notes, deepens cocoa-like undertones and moderates angular tannins, producing a more layered and complete mid-palate. It is particularly suited to cool-climate reds, early-harvest programs and wines matured with oak alternatives.
WAY OF APPLICATION	Hydrate in 10 parts wine / warm water, rest ~1 hour, add gently with pump-over.
DOSAGE	100–300 ppm (≈ 1–2.5 lb / 1,000 gal).
PACKAGING	5 kg bags.
STORAGE & SHELF LIFE	2 years sealed, cool and dry.

BÂTONNAGE Plus Texture

PRODUCT PROFILE	BÂTONNAGE Plus Texture is designed for early vinification stages, providing fermenting musts and young wines with mannoproteins, peptides and amino compounds that support fermentation behavior and encourage the development of fine, expressive mouthfeel from the beginning. It enhances varietal clarity in whites and rosé and contributes gentle mid-palate fullness in delicate reds.
WAY OF APPLICATION	Pre-hydrate 1:10, allow ~1 hour, add to must or young wine via circulation.
DOSAGE	100–300 ppm (≈ 1–2.5 lb / 1,000 gal).
PACKAGING	20 kg bags.
STORAGE & SHELF LIFE	2 years sealed, cool, dry.

ELEVAGE Glu

PRODUCT PROFILE	ELEVAGE Glu is a yeast derivative enriched in glutathione precursors, designed to protect oxidation-sensitive wines during the transition from fermentation to ageing. It helps prevent browning and pinking, preserves aromatic freshness and contributes subtle roundness and tension on the palate. It is especially appropriate for aromatic whites and rosé when the natural CO_2 blanket dissipates.
WAY OF APPLICATION	Hydrate 1:10 in wine or warm water, rest ~1 hour, add gently to tank.
DOSAGE	100–300 ppm (≈ 1–2.5 lb / 1,000 gal).
PACKAGING	5 kg bags.
STORAGE & SHELF LIFE	2 years sealed, cool and dry.

SUPER-MANN

PRODUCT PROFILE	SUPER-MANN is a purified mannoprotein extract from *Saccharomyces cerevisiae* hulls, fully soluble and intended for final finishing and bottle-stability reinforcement. Its colloidal action contributes to tartrate stabilization while also enhancing texture, aromatic integration and overall polish. It is particularly valuable in low-SO_2 programs and in wines requiring a final layer of softness and structural cohesion prior to bottling.
WAY OF APPLICATION	Pre-hydrate 1:10 in wine / warm water, rest ~1 hour and incorporate with careful circulation.
DOSAGE	100–300 ppm (≈ 1–2.5 lb / 1,000 gal).
PACKAGING	500 g packs.
STORAGE & SHELF LIFE	2 years sealed, cool, dry.


06

Tannins

AEB range of tannins

Tannins are among the most versatile processing aids in the cellar. They act as sacrificial **antioxidants, help stabilize color, support polymerization of phenolics and fine-tune structure and mouthfeel** from fermentation through to bottling. According to their botanical origin and degree of polymerization, tannins can:

- stabilize color by binding anthocyanins into more stable pigments
- protect wines and musts from oxidative damage and enzyme activity
- react with proteins and unstable phenolics
- reinforce or smooth the phenolic backbone
- contribute aromatic nuances (wood, spice, toast, nuts, caramel, etc.).

The **AEB tannin range** is organized into:

- **fermentation tannins** (FERMOTAN, TANETHYL, etc.)
- **tannins for whites and problematic grapes** (FERMOTAN Blanc, GALLOVIN, FERMOTAN Antibotrytis, PROTAN Bio Q)
- **finishing and ageing tannins** (PROTAN LINE, TANIBLANC, TANIQUERC)
- **ELLAGITAN Barrique oak tannins** (liquid and granular).

All tannins in this chapter are produced under **ISO 9001** and **HACCP quality systems**, comply with OIV/ Codex Oenologique standards, and are suitable for use in the USA, Canada and Mexico under TTB 27 CFR § 24.246 and applicable national regulations, when used within prescribed limits and according to their technical data sheets.

Fermentation tannins

PRODUCT	MAIN TANNIN TYPE	FORM	MAIN APPLICATION	TYPICAL DOSAGE (PPM)
FERMOTAN	Proanthocyanidin + ellagic	Granular	Red wine fermentation; color stabilization and early phenolic protection	120–400
FERMOTAN Liquid	Proanthocyanidin + ellagic	Liquid	Red wine fermentation; rapid dispersion for color stabilization	200–500
FERMOTAN AC	Proanthocyanidin blend	Granular	Under-ripe red grapes; mid-palate filling and phenolic balance	120–400
FERMOTAN AG	Grape skin proanthocyanidins + ellagic	Granular	High-malvidin varieties; color protection and stability	120–400
FERMOTAN CB	Grape skin + seed PA + quebracho	Granular	Structured reds; backbone, tannic density and aging potential	120–400
FERMOTAN SG	Hydrolysable tannins (ellagic-rich)	Granular	Fragile color reds (e.g. Pinot Noir, Sangiovese)	120–400
FERMOTAN SH	Seed + skin PA + quebracho	Granular	Syrah-type, high-malvidin red wines; structure and color depth	120–400
FERMOTAN Antibotrytis	Ellagic + proanthocyanidin	Granular	*Botrytis*-affected musts; oxidase control and phenolic protection	120–400
FERMOTAN Blanc	Hydrolysable tannins (oak + gallnut)	Granular	White and rosé wines; oxidation control and structure	60–240

PRODUCT	MAIN TANNIN TYPE	FORM	MAIN APPLICATION	TYPICAL DOSAGE (PPM)
GALLOVIN	Gallic tannin	Granular	*Botrytis* pressure; oxidase inhibition and protein reactivity	100–250
GALLOVIN Liquid	Gallic tannin	Liquid	*Botrytis* pressure; fast dispersion for oxidation control	150–400
PROTAN Bio Q	Quebracho proanthocyanidin (organic)	Granular	Oxidation protection during red fermentation (organic programs)	120–400
TANETHYL Effe	Ellagic + seed PA (aldehydic bridge)	Granular	Cold soak and fermentation; polymerization and color fixation	120–400

FERMOTAN line: scientific basis

University of Turin – DISAFA collaboration

DISAFA

The **FERMOTAN range** was developed within a **multi-year research program with the University of Turin (DISAFA)**, focused on how different tannin classes influence color preservation and pigment behavior during the first 72 hours of maceration.
The study compared varieties with distinct anthocyanin profiles (Nebbiolo, Sangiovese, Aglianico and Merlot) and measured:

- total and free anthocyanins
- color intensity
- anthocyanin speciation by HPLC

under controlled early-fermentation conditions with sampling at 6, 48 and 72 hours. To isolate technological effect, the absorbance contributed by the tannins themselves was discounted, so only the behavior of grape pigments was evaluated.

The **key conclusions** were:

- fragile, disubstituted anthocyanins are extracted early and need protective support in the first days of maceration
- wines that retain more free anthocyanins at 72 hours have a larger reactive pool available for later polymerization and long-term color stability
- the most effective tannin family depends on varietal pigment structure:
  - » **quebracho and ellagic–chestnut–quebracho blends** are particularly effective in varieties rich in fragile disubstituted pigments; e.g., Pinot Noir, Nebbiolo, Sangiovese (FERMOTAN SG)
  - » **grape-skin proanthocyanidins** in alcohol are especially suited to Merlot-Cab-type profiles, supporting early extraction while preserving pigment for later stabilization (FERMOTAN CB)
  - » **mixed hydrolysable + condensed tannins** perform best in high-trisubstituted matrices (malvidin-3-glucoside) such as Aglianico Syrah, Petit Verdot and Malbec (FERMOTAN AG).

Based on this work, FERMOTAN products combine different tannin families (skin-derived, seed-derived, ellagic, chestnut, Quebracho) according to the phenolic architecture and pigment vulnerability of specific varietal groups.

FERMOTAN & FERMOTAN Liquid

PRODUCT PROFILE

The most traditional line of fermentation tannins, composed of approximately 60% proanthocyanidins and 40% ellagic tannins. FERMOTAN works to preserve the original content of:

- color: by "locking" unstable monomeric pigments into more stable polymeric forms as soon as they are extracted
- tannins: by acting as sacrificial phenolics that react with proteins and oxidized compounds, instead of native grape tannins being lost.

FERMOTAN should be added right at the beginning of red fermentation in order to shield the must from oxidation and stabilize newly extracted pigments from the outset. FERMOTAN Liquid offers the same concept in an easy-to-dose liquid form, ideal where rapid solubilization and minimal handling are required.

USAGE

Mix well into 10 parts of wine or must and add to the tank during a pump-over.

DOSAGE

Powder:

- 120–400 ppm or 1–3 lbs/1,000 gallons.

Liquid:

- 200–500 ppm or 1.5–4 lbs/1,000 gallons.

PACKAGING

Available in 1 kg packets and 15 kg bags (powder), 5 and 25 kg pails (liquid).

TTB 27 CFR § 24.246

FERMOTAN AC

PRODUCT PROFILE

With a chewy, lingering taste, FERMOTAN AC is ideal for color stabilization in grapes that do not reach complete phenolic maturity. It complements phenolic deficiencies by adding volume without green bitterness, giving the winemaker the option of multiple additions during fermentation without compromising elegance.

Technologically, FERMOTAN AC:

- stabilizes color by promoting early pigment–tannin polymerization
- fills in "holes" in the mid-palate where natural tannin structure is lacking
- helps mask slightly rustic phenolics from under-ripe skins.

USAGE

Mix in 10 parts of wine or must and add during a pump-over.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

PACKAGING

Available in 5 kg bags.

TTB 27 CFR § 24.246

FERMOTAN AG

PRODUCT PROFILE

FERMOTAN AG is formulated for varieties rich in Malvidin-type anthocyanins, which are released more slowly and are best supported by grape-skin–derived tannins, a major component of this product. Grape-skin tannins make the action of FERMOTAN AG particularly smooth and efficient, limiting harshness while enhancing color stability.
Other components include ellagic tannins from oak (antioxidant support) and Quebracho tannins (sacrificial phenolics), reflecting the DISAFA work on high-trisubstituted anthocyanin matrices.
Formulated specifically for Aglianico, Malbec, Zinfandel, Tempranillo, Negroamaro, Nero d'Avola, Pinotage and similar varieties.

USAGE

Mix in 10 parts of wine or must and add during a pump-over.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

PACKAGING

Available in 5 kg bags.

TTB 27 CFR § 24.246

FERMOTAN CB

PRODUCT PROFILE

FERMOTAN CB combines grape-skin and grape-seed tannins to capture and stabilize Malvidin pigments and to build a soft but complete structure that will integrate with the varietal tannins over time. A portion of Quebracho tannins provides a sacrificial function, protecting original grape phenolics from oxidative loss.
Formulated specifically for Cabernet Sauvignon, Merlot, Barbera, Montepulciano, Teroldego and other structured reds where backbone and aging potential are key.

USAGE

Mix in 10 parts of wine or must and add during a pump-over.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

PACKAGING

Available in 5 kg bags.

TTB 27 CFR § 24.246

FERMOTAN SG

PRODUCT PROFILE

FERMOTAN SG is designed for varieties like Pinot Noir and Sangiovese, rich in "fragile" disubstituted pigments such as cyanidin and peonidin anthocyanins.
It contains an important fraction of hydrolysable tannins with strong antioxidant power, specifically selected to protect these sensitive pigments in the first days of maceration and to limit oxidative color loss.

USAGE

Mix in 10 parts of wine or must and add during a pump-over.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

PACKAGING

Available in 5 kg bags.

TTB 27 CFR § 24.246

TANETHYL Effe

PRODUCT PROFILE

TANETHYL Effe is a complex of ellagic tannins and seed-derived proanthocyanidins with an aldehydic bridge integrated into the structure. This gives it very high reactivity toward anthocyanins and other polyphenols, making the proanthocyanidin fraction immediately available for color stabilization against the effects of sulfur, pH shifts, oxygen and aging.
Thanks to its ellagic component, TANETHYL Effe is particularly recommended:

- during red fermentation, where it works in synergy with oxygen to promote ethanal bridge formation and polymerization of color and structure
- in cold soak, when alcohol is not yet present and natural ethanal levels are low, to initiate polymerization earlier.

USAGE

Mix in 10 parts of wine or must and add during a pump-over or via Venturi.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

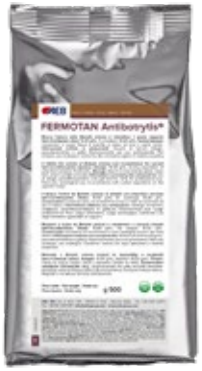
PACKAGING

Available in 1 kg packets.

TTB 27 CFR § 24.246

Fermentation tannins for whites and problematic grapes

FERMOTAN Antibotrytis



PRODUCT PROFILE

A formulation of low-molecular-weight ellagic and proanthocyanidin tannins developed to counteract the oxidative effect of Botrytis-derived polyphenol oxidases (mainly tyrosinase, and to a lesser extent laccase). It is particularly useful at reception and first racking to limit browning and preserve aromatic freshness in compromised fruit.

USAGE

Mix in 10 parts of must or wine and add on the receiving conveyor and again at racking, when needed.

DOSAGE

- 240–400 ppm (2–3 lbs/1,000 gallons) on grapes or during pump-over.
- 120–240 ppm (1–2 lbs/1,000 gallons) at racking.

PACKAGING

Available in 1 kg bags.

TTB 27 CFR § 24.246

FERMOTAN Blanc

PRODUCT PROFILE

A blend of hydrolysable tannins from untoasted oak and gallnuts, geared to protect musts and wines from oxidation and to lift the mid-palate in whites and rosés. Particularly useful at the exit of the press, where it can bind oxidized phenols and protect delicate varietal aromas while adding a gentle structural frame.

USAGE

Make a slurry in 10 parts of wine or must and add at the exit of the press or early in the fermentation.

DOSAGE

Depending on the variety, typically 60–240 ppm or ½–2 lbs/1,000 gallons (often 50–200 ppm).

PACKAGING

Available in 1 kg bags.

TTB 27 CFR § 24.246

GALLOVIN & GALLOVIN Liquid

PRODUCT PROFILE

Gallic tannins derived from the core of gallnuts, purified from external catechins that can be present when whole nuts are extracted. They are strong antioxidants with minimal color contribution and high reactivity toward proteins and polyphenol oxidases (laccase, tyrosinase), making them ideal for musts and wines affected by *Botrytis cinerea* or significant oxidative pressure.

USAGE

Mix in 10 parts of wine or must and add on the receiving conveyor and at racking.

DOSAGE

Powder:
- 100–250 ppm on grapes or during pump-over
- 100–150 ppm at racking.

Liquid:
- 150–400 ppm on grapes or after must fining
- 50–75 ppm at racking.

PACKAGING

Available in 500 g packs and 5 kg bags (powder) and 25 kg pails (liquid).

TTB 27 CFR § 24.246

PROTAN Bio Q

PRODUCT PROFILE

An organic-certified proanthocyanidin derived from Quebracho wood. It offers added protection against oxidation, strengthens the phenolic backbone and helps wines age better and preserve color, especially in programs with reduced SO_2.

USAGE

Mix in 10 parts of wine or must and add during a pump-over.

DOSAGE

120–400 ppm or 1–3 lbs/1,000 gallons.

PACKAGING

Available in 0.5 kg bags.

TTB 27 CFR § 24.246

Finishing tannins

PRODUCT	MAIN TANNIN TYPE	FORM	MAIN APPLICATION	TYPICAL DOSAGE (PPM)
PROTAN Bois	Proanthocyanidin (quebracho)	Granular	Structure building, aging support, micro-oxygenation programs	100–300
PROTAN Fresh	Proanthocyanidin	Granular	Restore freshness and lift in tired or dull wines	60–240
PROTAN LXP	Proanthocyanidin (acacia / lemon wood)	Granular	Body, crispness and freshness in white wines	60–200
PROTAN Malbec	Grape seed proanthocyanidins (ripe seeds)	Granular	Nutty seed notes; filling mid-palate gaps in reds	30–400
PROTAN Pépin Oxilink	Grape seed proanthocyanidins	Granular	Old-world structure; barrel aging and micro-oxygenation	30–400
PROTAN Plus	Wood proanthocyanidins + mannoproteins	Granular	Volume enhancement and color stabilization	200–400
PROTAN Raisin	Grape skin tannins	Granular	Skin-like extraction effect; texture and volume	30–400
TANETHYL	Seed proanthocyanidins (aldehydic bridge)	Granular	Early polymerization, color locking and tannin integration	200–400
TANIBLANC Fresh	Proanthocyanidin + gallic tannins	Granular	White and rosé wines; freshness and antioxidant protection	60–200
TANIQUERC	Ellagic tannins	Granular	Toasty oak notes; aging and micro-oxygenation support	200–400
ELLAGITAN Barrique Liquid	Ellagic tannins (oak origin)	Liquid	Oak integration and color stabilization	120–720
EB Berry Mix	Ellagic tannins (oak origin)	Liquid	Fruit lift with berry and spice oak nuances	120–720
EB Fruit Reserve	Ellagic tannins (oak origin)	Liquid	Low-imprint oak support and mid-palate enhancement	120–720
EB Goud Ron	Ellagic tannins (oak origin)	Liquid	Tar, smoke and old-world complexity	120–720
EB XO	Ellagic tannins (oak origin)	Liquid	Strong toast, smoke and chocolate profile	120–720
ELLAGITAN Barrique Rouge	Ellagic tannins (toasted oak)	Granular	Oak barrel mimic; red wine aging support	100–720
ELLAGITAN Barrique Blanc	Ellagic tannins (French oak)	Granular	White and rosé aroma protection and body	60–500

AEB range of finishing tannins

PROTAN Bois

PRODUCT PROFILE

A proanthocyanidin tannin derived from Quebracho, partially polymerized to act as a structure enhancer without adding bitterness. Because of its condensed nature, it is effective in:

- stabilizing color in reds
- supporting aging during long storage or micro-oxygenation
- tightening structure while preserving roundness.

USAGE

Mix in 10 parts of wine or must and add during a pump-over or via Venturi.

DOSAGE

- 100–300 ppm on grapes or during pump-over
- 100–250 ppm at racking.

PACKAGING

Available in 500 g packets and 5 kg bags.

TTB 27 CFR § 24.246

PROTAN Fresh

PRODUCT PROFILE

A proanthocyanidin designed to bring back freshness to “tired” wines. It can be used in reds, whites and rosés to slow apparent aromatic and structural aging, brighten the palate and re-focus fruit.

USAGE

Mix in 10 parts of wine and add to the tank with a Venturi system.

DOSAGE

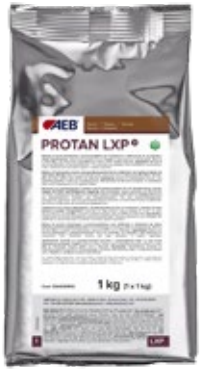
- Whites: ~60 ppm (½ lb/1,000 gallons).
- Reds: 120–240 ppm (1–2 lbs/1,000 gallons).

PACKAGING

Available in 1 kg packets.

TTB 27 CFR § 24.246

PROTAN LXP



PRODUCT PROFILE

A proanthocyanidin extracted from non-traditional woods including lemon tree and acacia. In white wines it:

- adds a layer of body and structure,
- enhances crispness and length,
- brightens the finish and emphasizes varietal definition.

USAGE

Mix in 10 parts of wine or must and add to the tank during a pump-over.

DOSAGE

60–200 ppm or ½–1.5 lbs/1,000 gallons.

PACKAGING

Available in 1 kg packets.

TTB 27 CFR § 24.246

PROTAN Malbec

PRODUCT PROFILE

A proanthocyanidin sourced from extra-ripe grape seeds, bringing the typical nutty notes normally extracted from pips, but without bitterness or green characters.
In reds, it fills the “donut” gap in wines where seeds were removed early because they were under-ripe and structure is hollow in the middle.
In whites, small additions add a touch of sharpness and crispness to otherwise dull wines.

USAGE

Mix in 10 parts of wine or must and add via Venturi.

DOSAGE

- Whites: 30–60 ppm (¼–½ lb/1,000 gallons).
- Reds: 200–400 ppm (1.5–3 lbs/1,000 gallons).

PACKAGING

Available in 500 g packets.

TTB 27 CFR § 24.246

PROTAN Pépin Oxilink

PRODUCT PROFILE

A grape-seed tannin that brings an “old-world” structural edge without bitterness. It is ideal for reds meant to age and whenever the winemaker wants a more European-style tannic profile.
Thanks to its high affinity for aldehydes, PROTAN Pépin Oxilink is particularly suited to:

- barrel-aged wines,
- wines undergoing micro-oxygenation,
- programs where long-term polymerization and color stability are critical.

USAGE

Mix in 10 parts of wine or must and add via Venturi.

DOSAGE

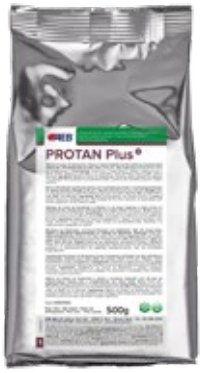
- Whites: 30–60 ppm (¼–½ lb/1,000 gallons).
- Reds: 200–400 ppm (1.5–3 lbs/1,000 gallons).

PACKAGING

Available in 500 g packets.

TTB 27 CFR § 24.246

PROTAN Plus



PRODUCT PROFILE

A combination of wood-derived proanthocyanidins and yeast mannoproteins, PROTAN Plus adds volume to red wines and supports color stabilization. It is intended for the second half of fermentation or the beginning of aging, when structural integration and polymerization paths are being defined.

USAGE

Mix in 10 parts of wine or must and add during a pump-over or via Venturi.

DOSAGE

200–400 ppm or 1.5–3 lbs/1,000 gallons.

PACKAGING

Available in 500 g packets and 5 kg bags.

TTB 27 CFR § 24.246

PROTAN Raisin

PRODUCT PROFILE

Adding PROTAN Raisin to a red wine is like adding extra days of maceration on the skins. It is a tannin extracted from grape peels, bringing the typical polymerized structure of tannins naturally extracted from skins.

- In reds, it contributes to body, color stabilization and overall phenolic polymerization.
- In whites and rosés, low additions improve mid-palate and complexity.

USAGE

Mix in 10 parts of wine or must and add via Venturi.

DOSAGE

- Whites: 30–60 ppm (¼–½ lb/1,000 gallons).
- Reds: 200–400 ppm (1.5–3 lbs/1,000 gallons).

PACKAGING

Available in 500 g packets.

TTB 27 CFR § 24.246

TANETHYL

PRODUCT PROFILE

A seed-derived proanthocyanidin with an aldehydic bridge integrated into the structure, giving it high reactivity for polymerization with anthocyanins and other polyphenols. TANETHYL is immediately available to lock color against sulfur, pH changes, oxygen and natural aging, even in the absence of strong oxygen inputs.
It is recommended for wines that need structure to start polymerizing early, or where oxygenation is limited and aldehyde-mediated bridges need support.

USAGE

Mix in 10 parts of wine or must and add during a pump-over or via Venturi.

DOSAGE

200–400 ppm or 1.5–3 lbs/1,000 gallons.

PACKAGING

Available in 500 g packets.

TTB 27 CFR § 24.246

TANIBLANC Fresh

PRODUCT PROFILE

A blend of proanthocyanidins and gallic tannins created to bring a refreshing edge to white wines.
Maintains fresh, cool aromatic notes reminiscent of eucalyptol, balsamic and spicy nuances.
Used during fermentation, it protects citrus and floral aromas and limits oxidative browning.
In finished wines, it sharpens the profile and extends the finish without harshness.

USAGE

Mix in 10 parts of wine or must and add during a pump-over or via Venturi.

DOSAGE

60–200 ppm or ½–1.5 lbs/1,000 gallons.

PACKAGING

Available in 1 kg packets.

TTB 27 CFR § 24.246

TANIQUERC

PRODUCT PROFILE

An ellagic tannin that brings nuances of toasted oak to the wine and helps with aging by providing a substrate for oxygen to form ethanal bridges. These bridges link tannin to tannin and color to tannin, strengthening the phenolic network and promoting a more integrated, long-lived structure.
TANIQUERC is recommended in:

- barrel-aged reds needing extra backbone and oak-like complexity
- structured whites requiring subtle toast notes and improved resistance to oxidation
- wines undergoing controlled micro-oxygenation programs
- fix small reduction issues.

USAGE

Mix in 10 parts of wine and add to the tank during a pump-over or via Venturi.

DOSAGE

200–400 ppm or 1.5–3 lbs/1,000 gallons.

TTB 27 CFR § 24.246

The ELLAGITAN Barrique Line

American and French oak-derived tannins, in liquid and powder forms, for fermentation, aging and fine-tuning. The ELLAGITAN Barrique line is calibrated so that aromatic impact is always supported by an appropriate level of structuring ellagic tannins.

- Wood origin and toasting level define the aromatic profile.
  - » French oak: more vanilla, structure, and balanced extraction.
  - » American oak: more volatile phenols (eugenol, guaiacol – spice/smoke) and aldehydes (furfural – almond), with careful adjustment of tannin structure.
- All ELLAGITAN Barrique products are adjusted to avoid resins or bitter compounds, to dissolve quickly and to inhibit unwanted microbial growth, reducing the need for SO_2.

ELLAGITAN Barrique Liquid

PRODUCT PROFILE

The most “French” of the liquid line, with a strong vanilla and coconut/whisky-lactone character. It opens the fruit, enhancing red and black berries and adding a subtle peppercorn note to the spice profile. Ideal for:

- red wines requiring both fruit lift and oak integration
- structured whites where a measured oak overlay is desired.

USAGE

Dilute in 10 parts of wine and add during fermentation or at any other stage. Avoid additions in the 2 weeks before microfiltration.

DOSAGE

- 10 ppm = 1 g/hL = 0.083 lb/1,000 gal ≈ 0.85 mL/hL or 32 mL/1,000 gal.
- Typical range 120–720 ppm or 10–60 mL/hL (380–2,280 mL/1,000 gal or 1–6 lbs/1,000 gal).
- Minimum for light nuances in reds: 120 ppm (1 lb/1,000 gal).
- For whites: 30–120 ppm (¼–1 lb/1,000 gal).

SHELF LIFE

3 years in original sealed packaging, cool, dry, away from light.

PACKAGING

1 kg bottles, 10 kg pails.

TTB 27 CFR § 24.246

EB Berry Mix

PRODUCT PROFILE

ELLAGITAN Barrique Berry Mix helps stabilize color while introducing a soft structural note that brings smoothness and roundness. On the nose, it:

- enhances the sweet, ripe fruit notes,
- carries a pleasant bouquet of spices and toasted oak.

Particularly suited for:

- fruit-driven reds where berry notes and gentle oak are desired
- blends needing a bit sweeter spice and polished tannin.

USAGE

As for ELLAGITAN Barrique Liquid (see above).

DOSAGE

As for ELLAGITAN Barrique Liquid (see above).

PACKAGING

Available in 1 kg bottles and 10 kg pails.

TTB 27 CFR § 24.246

EB Fruit Reserve

PRODUCT PROFILE

The ELLAGITAN Barrique product with the least aromatic imprint, ideal where the goal is to support what the wine already has rather than cover defects.

- Helps the wine “take off” with its own fruit, opening the bouquet and enhancing natural varietal intensity.
- Adds almond and caramel nuances while reinforcing mid-palate.

Recommended for:

- delicate reds and whites where subtle oak integration is required
- premium wines where existing aromatics must remain in the foreground.

USAGE

As per ELLAGITAN Barrique Liquid.

DOSAGE

As per ELLAGITAN Barrique Liquid.

SHELF LIFE

As per ELLAGITAN Barrique Liquid.

PACKAGING

As per ELLAGITAN Barrique Liquid.

TTB 27 CFR § 24.246

EB Goud-Ron

PRODUCT PROFILE

Designed to stabilize color while adding both structure and smoothness. Aromatically, EB Goud-Ron shows notes of “goudron” (tar) typical of old-world wines, reminiscent of great reds from Rhône and Piedmont. It is ideal for:

- robust reds where earthy, smoky and tarry notes are welcome
- blends needing more “old-world” complexity without oak chips or staves.

USAGE

As per ELLAGITAN Barrique Liquid.

DOSAGE

As per ELLAGITAN Barrique Liquid.

SHELF LIFE

As per ELLAGITAN Barrique Liquid.

PACKAGING

As per ELLAGITAN Barrique Liquid.

TTB 27 CFR § 24.246

EB XO

PRODUCT PROFILE

The most expressive in the nose among the ELLAGITAN Barrique liquids. It gives:

- pronounced smoky/toasted notes
- enhanced sensations of spice, chocolate, leather and earth.

Not recommended for smoke-tainted or *Brett*-affected wines, but very effective at masking other defects (burnt rubber, slight reduction, mild green notes) and enriching the bouquet of sound wines.

USAGE

As for ELLAGITAN Barrique Liquid.

DOSAGE

As for ELLAGITAN Barrique Liquid.

PACKAGING

As for ELLAGITAN Barrique Liquid.

TTB 27 CFR § 24.246

ELLAGITAN Barrique Rouge

PRODUCT PROFILE

Granulated tannin extracted from highly toasted oak wood. The seasoning process exceeds two years and follows techniques used for top-end barrels. The innovative extraction system hydrolyzes ellagic tannins and precipitates bitter substances; polysaccharidic micromolecules encapsulate toasted aromas and prevent their loss during spray-drying.

DIRECTIONS FOR USE

Rehydrate in warm water (35 °C / 95 °F) or wine for at least ½ hour, then make a slurry 1:10 in wine and add to a circulating tank or barrel. Allow at least one week before filtration.

DOSAGE

- Light nuances in reds: ≥100 ppm (0.8 lb/1,000 gal).
- Whites: 30–120 ppm (¼–1 lb/1,000 gal).

Typical range up to ~720 ppm depending on style.

SHELF LIFE

3 years in original sealed packaging, cool, dry, away from light.

PACKAGING

500 g and 10 kg bags.

TTB 27 CFR § 24.246

ELLAGITAN Barrique Blanc

PRODUCT PROFILE

Colorless version of ELLAGITAN Barrique Rouge, extracted from French oak staves. It has minimal impact on color and is used to:

- highlight varietal aromas of white and rosé wines
- protect against browning in wines with prolonged cold skin contact
- improve bouquet complexity by regulating redox potential during and after fermentation
- provide a soft, velvety mouthfeel and body similar to extended barrel aging
- inhibit bacteria or mold, reducing SO_2 needs.

DIRECTIONS FOR USE

Rehydrate in warm water (35 °C / 95 °F) or wine for at least ½ hour, then make a slurry 1:10 in wine and add directly to a circulating tank or barrel. Allow at least one week before filtration.

DOSAGE

6–50 g/hL (½–4 lbs/1,000 gal), depending on desired impact.

SHELF LIFE

3 years in original sealed packaging, cool, dry, odor-free.

PACKAGING

500 g packets.

TTB 27 CFR § 24.246

Fining agents & Stabilizers

Processing aids for the final stage

Fining and stabilization begin at the must stage and continue through élevage and pre-bottling. **Positively charged proteins** (gelatin, casein, plant proteins) and polysaccharides are used to remove phenolics, proteins and colloids; **mineral agents** like bentonite, silica and carbon manage proteins and color; **dedicated products** help control redox, tartrate stability, microbiology and re-fermentation. **Chitosan-based tools** provide modern options for both microbiological control and heavy-metal fining. All products in this chapter are designed as processing aids for professional wine production. Bench trials are strongly recommended before cellar-scale use.

Vegan fining agents

Rationale and regulatory framework

Vegan fining agents have become a global standard in modern winemaking, driven by regulatory, commercial, and consumer demands. Notably, **New Zealand wineries** operate **almost exclusively with vegan fining protocols**, reflecting strong market expectations for allergen-free and plant-based processing aids. Beyond ethical positioning, vegan fining offers **important technical advantages**: consistent supply, high selectivity, and excellent lees compaction without the allergen-labeling concerns associated with animal-derived proteins.

Historically, vegetable proteins such as pea protein were not listed in § 24.246 and therefore required prior approval from TTB, either through an experimental authorization under § 24.249 or a continual-use request under § 24.250, often including sample submission and technical documentation. This created uncertainty and administrative burden for wineries wishing to adopt vegan fining practices.

Today, this situation has changed. Under 27 CFR § 24.250, TTB has administratively **approved pea protein for continual use**, determining it to be acceptable in good commercial practice. As a result, pea protein is now listed on TTB's official webpage of "Wine and Juice Treating Materials and Processes Administratively Approved for Continual Use Pending Rulemaking." This means wineries **no longer need to file an experimental application**, request authorization, or submit samples, provided pea protein is used within the approved limit of 0.5 g/L (50 g/hL) and in accordance with FDA GRAS status (GRN 000182).

In practical terms, pea protein has moved from a case-by-case approval model to a generally authorized cellar practice, aligning U.S. regulations with modern international winemaking standards.

PRODUCT	COMPOSITION / ORIGIN	MAIN APPLICATION	FORM	TYPICAL DOSAGE (PPM)
VE-Gel	Pea proteins, yeast hulls, autolysates of yeast	Clarification of white, rosé and red wines	Granular	50–200
VE-Gel Liquid	Pea proteins, citric acid, Bentonite, KMS, water	Rapid clarification; low lees volume	Liquid	100–400

PRODUCT	COMPOSITION / ORIGIN	MAIN APPLICATION	FORM	TYPICAL DOSAGE (PPM)
CATALASI Vega	Bentonite, PVPP, pea protein, silica	Phenolic correction and oxidation control	Granular	50–150
SPINDASOL	30% silica	clarification of musts and wines in conjunction with protein based and carbon fining	Liquid	500–2000
MICROCEL AF	Bentonite, cellulose, PVPP	Clarification and oxidation cleanup	Granular	100–500
DECORAN Gran	Activated vegetal carbon	Decolorization; odor removal	Granular	50–500
DECORAN XL	High-purity vegetal carbon	Strong color and off-odor removal	Granular	50–300
BENTOGRAN	Sodium-activated bentonite	Protein stabilization	Granular	300–1200
CARBOSIL	Silica sol + carbon	Color fining & clarification	Liquid	50–200
FREE4FENOL	Carbon-based adsorbent	Smoke taint and Brett odors removal	Granular	100–400

Vegan fining

Fermentation and early-stage phenolic fining

Early phenolic and protein fining during fermentation or immediately after pressing is a highly effective strategy to **manage oxidation, color evolution, and phenolic harshness while minimizing corrective treatments** later in the winemaking process. By intervening at this stage, these fining agents selectively remove oxidizable phenolics, unstable proteins, and bitterness-contributing compounds when they are most reactive, improving fermentation cleanliness, color stability, and overall wine balance. Early fining also reduces the need for aggressive post-fermentation clarification, helping preserve aroma, freshness, and volume.

Several of the products in this category are **designed to meet allergen-free or vegan requirements**. In the case of products such as CATALASI AF Plus, although trace fining proteins may be present at the moment of addition, they function strictly as processing aids and are removed through settling and/or filtration. When used according to recommended protocols, residual allergenic proteins are not detectable in the finished wine, and allergen labeling is therefore not required. **This approach is fully consistent with TTB, OIV, and EU regulatory frameworks**, which recognize that fining agents effectively removed from the wine do not constitute allergens in the final product.

Together, these fermentation and early-stage fining tools provide winemakers with precise control over phenolic expression, oxidation risk, and allergen management, supporting both technical performance and market-driven labeling requirements.

Phenolic / protein fining agents

PRODUCT	MAIN APPLICATION / FUNCTION	STAGE OF USE	RECOMMENDED DOSAGE	BEST WAY OF APPLICATION
MICROCEL	Fermentation-phase caseinate / cellulose / bentonite complex for early phenolic management	Start of fermentation (whites / rosés)	200–500 ppm (20–50 g/hL)	Prepare as slurry in water and add at early fermentation under circulation
CATALASI	Bentonite, potassium caseinate, KMS, swine gelatin, ascorbic acid	Must & wine fining (whites, rosés, reds)	200–500 ppm (20–50 g/hL)	Hydrate only in water, allow swelling, then add with good mixing
CATALASI AF Plus	Bentonite, isinglass, food gelatine (fish and animal), PVPP, silica gel	Wine fining (whites, rosés, reds)	200–500 ppm (20–50 g/hL)	Hydrate in water (never in wine), rest to swell, then add
GELSOL	Liquid gelatin clarifier for must clarification and red/ rosé fining	Must clarification; reds & rosés	Must clarification: ~6 g/hL with 5–10× dilution	Dose liquid directly during pump-over, flotation or rack-and-return
QUICKGEL AF	Swine gelatine, fish gelatin, bentonite, silica, yeast proteins	Must and wine clarification	300–900 ppm (30–90 g/hL; 2.5–6 lb/1,000 gal)	Hydrate in water, allow activation before addition

MICROCEL *and* ***GELSOL*** *are registered trademarks of AEB.*

Phenolic fining agents
Summary table

Other cellar treatments & stabilization tools

The products listed in this section are primarily stabilization tools rather than classic fining agents. Their main function is to **improve microbiological, oxidative, colloidal, metal, or tartrate stability**, supporting wine cleanliness and shelf life rather than directly clarifying. Most act through protective, inhibitory, or complexing mechanisms and are used at key moments from fermentation through finishing and bottling.

Within this group, **chitosan-based products** are the main exception, as they can also exert a true fining action, particularly on metals and oxidizable compounds, even though chitosan was originally introduced in winemaking for microbiological control. Used correctly, these stabilization tools allow **targeted, preventative interventions that reduce the need for heavier corrective fining later**, while **preserving varietal character** and **sensory balance**.

PRODUCT	COMPOSITION / ORIGIN	MAIN APPLICATION	STAGE OF USE	TYPICAL DOSAGE	KEY NOTES
ANTIBRETT 2.0	Yeast hulls + chitosan (*Aspergillus niger*) + β-glucanase	*Brettanomyces* control; volatile phenol reduction	Wine	5–25 g/hL	Preventive & curative; adsorbs 4-EP / 4-EG; improves filtration
AROMAX B4	Ascorbic acid + potassium metabisulfite on perlite	Harvest antioxidant protection	Harvest / Must	0.5–1 kg/ton	Floating protective "lid"; gradual SO_2 release

PRODUCT	COMPOSITION / ORIGIN	MAIN APPLICATION	STAGE OF USE	TYPICAL DOSAGE	KEY NOTES
BENTOGRAN	Sodium-activated bentonite (granular)	Protein stabilization	Wine	12–50 g/hL	High efficiency; lower aroma impact vs standard bentonites
CARBOSIL	Silica sol + activated carbon + bentonite (liquid)	Clarification & color correction	Must / Wine	250–600 ppm	Dust-free liquid carbon; compact lees
CHITO-F	Chitosan + fumaric acid	LAB control; MLF inhibition	Post-AF	30–75 g/hL	Antimicrobial + acidification
CHITOCEL	Fungal chitosan + yeast hulls	Microbial control; heavy-metal removal	Wine	120–180 ppm	Acts on Brett, LAB, metals, OTA
CHITOCEL Must	Chitosan + tannins + yeast autolysates (GSH)	Must protection; antioxidant support	Must / Early AF	15–40 g/hL	Controls spoilage flora; supports freshness
CRYSTALFLASH	Potassium bicarbonate + tartrates + bentonite + cellulose	Cold-stabilization accelerator	Wine (cold)	20–40 g/hL	Seeds tartrate crystallization
DEACID	Potassium bicarbonate + neutral tartrate	Acidity reduction	Wine	~130 g/hL per 1 g/L TA	Bench trials required
DESULFIN	Stabilized copper sulfate (liquid)	H_2S & mercaptan removal	Wine	~100 ppm	Precise copper dosing; respect legal Cu limits
FREE4FENOL	Activated carbon blend	Volatile phenol reduction	Must / Wine	10–80 g/hL	Smoke-taint & phenolic off-notes
LYSOCID W	Lysozyme (egg-white origin)	LAB control; MLF management	Must / Wine	10–40 g/hL	Allergenic (egg); strong LAB selectivity
MICROCID	Potassium sorbate + antioxidants	Refermentation prevention	Wine	~50 g/hL	Sweet wine protection
MICROCID F	Potassium sorbate + fumaric acid	Refermentation prevention	Wine	25–60 g/hL	Extra LAB control vs sorbate alone
NEW-CEL	Sodium carboxymethyl-cellulose (CMC)	Tartrate stabilization	Wine (pre-bottling)	100–150 g/hL	Requires protein-stable, filtered wine
NEW-CEL +17	Concentrated CMC solution	Tartrate stabilization	Wine (pre-bottling)	12–60 g/hL	Lower dose; strict application conditions
PROTECT-F	Fumaric acid + tannins	LAB inhibition; antioxidant support	Must / Wine	100–600 ppm	Alternative to lysozyme / SO_2 strategies
SPINDASOL W	Silica sol (liquid)	Floc compaction	Must / Wine	3–10× fining dose	Improves settling & lees compaction
STERYL Fusti*	Allyl isothiocyanate tablets	Flor (Pichia) prevention in barrels	Storage	1 tablet/barrel	Headspace sanitation
STERYL Vasche*	Allyl isothiocyanate tablets	Flor prevention in tanks	Storage	1 tablet/tank	Volatile antiseptic

** not in the TTB list of products allowed in winemaking.*

Stabilizations products

ANTIBRETT 2.0

Brett management & phenol adsorption

PRODUCT PROFILE	ANTIBRETT 2.0 combines yeast hulls, chitosan from *Aspergillus niger* and β-glucanase. It is specifically engineered to target *Brettanomyces*, adsorb 4-ethylphenol and 4-ethylguaiacol, and reduce off-characters from dirty barrels, smoke or mold. It can be used both preventively and curatively, ideally with free SO_2 ≥25 mg/L. β-glucanase helps break down biofilms and compact lees, improving filtration after treatment.
BEST WAY OF APPLICATION	Pre-suspend the powder in water or wine to obtain a smooth slurry, then add under pump-over or tank turbulence so the chitosan matrix contacts the entire wine volume during the contact period.
DOSAGE	5–25 g/hL depending on contamination level.
PACKAGING	500 g cans.
SHELF LIFE & STORAGE	2 years; store cool, dry, away from light and heat.

AROMAX B4

Harvest antioxidant shield

PRODUCT PROFILE	AROMAX B4 combines ascorbic acid and potassium metabisulfite immobilized on a floating inert substrate (perlite). Once in contact with juice, the perlite floats and forms a “protective lid” on the surface of bins, gondolas or receiving tanks, releasing SO_2 and ascorbic acid gradually where berries are broken and oxygen is highest. This limits enzymatic oxidation and microbial growth during machine harvesting, transport and crushing.
BEST WAY OF APPLICATION	Evenly sprinkle AROMAX B4 over the berry or must surface so the perlite forms a continuous floating layer; do not premix in liquid, as its protective action depends on surface contact and gradual release during transport and crushing.
DOSAGE	0.5–1 kg/ton; 1 kg/ton delivers ≈54 ppm SO_2 and 60–70 ppm ascorbic acid.
PACKAGING	5 kg bags.
SHELF LIFE & STORAGE	2 years; store at room temperature, dry and non-humid.

BENTOGRAN

High-performance granular bentonite

PRODUCT PROFILE

BENTOGRAN is a pharmaceutical-grade activated sodium bentonite in granular form, dust-free and easy to handle. Compared to standard bentonites, it has 3–4× higher active surface area, producing larger floccules with stronger clarifying power and lower impact on aroma. As a result, effective protein stabilization is achieved with lower bentonite rates and less dilution water added to the wine.

HYDRATION AND HANDLING (CRITICAL POINTS)

Because of its fine particle size and strong swelling capacity, BENTOGRAN forms a creamy gel and can settle more slowly, especially at low cellar temperatures. At 50 °F (10 °C), particles remain highly hydrated and may stay in suspension longer; what appears as “bentonite in solution” is typically very fine hydrated particles. Hydrate BENTOGRAN in 10–15 parts water at ambient to lukewarm temperatures (≈55–75 °F / 13–24 °C). Very cold water slows hydration; water above ≈85–90 °F (29–32 °C) is not recommended, as it can negatively affect swelling structure. Allow a proper rest after mixing, aiming for at least 30–60 minutes. Mixing initiates most of the swelling; the rest period allows the gel structure to fully develop. Swelling temperature should remain roughly in the same range as hydration. Rehydration at ~10:1 water: bentonite should yield a thick, gel-like slurry. A very fluid slurry usually indicates too much water, insufficient swelling time, or excessively cold conditions. For best protein removal, wines should be treated and allowed to settle at >50 °F (10 °C); below that, protein mobility decreases and adsorption slows, requiring longer contact time and/or higher dosage and giving less predictable results.

BEST WAY OF APPLICATION

Once the slurry has fully swollen in water, add BENTOGRAN to the wine under strong tank turbulence or pump-over so the gel disperses quickly and uniformly; avoid hydrating directly in wine, as this reduces swelling efficiency and can compromise protein removal.

DOSAGE

12–50 g/hL (≈1–4 lb/1,000 gal).

PACKAGING

1 kg packs; 25 kg bags.

SHELF LIFE & STORAGE

4 years; store cool, dry, non-humid.

CARBOSIL

Silica/carbon liquid clarifier

PRODUCT PROFILE

CARBOSIL is a liquid clarifying blend of silica sol, decolorizing carbon and a small amount of bentonite. It offers fast, efficient color removal and clarification in musts and wines, especially Pinot Grigio / Pinot Gris and over-ripe white fruit. Being liquid, carbon is already hydrated and dust-free, improving safety and consistency versus powdered carbons. Treated wines show clear, compact lees without residual carbon specks.

BEST WAY OF APPLICATION

Add CARBOSIL as supplied (no pre-swelling required) under tank turbulence or flotation circulation so it disperses rapidly; when used with gelatin, add the gelatin first and dose CARBOSIL afterward to compact and clarify the formed floc.

DOSAGE

With gelatin, CARBOSIL at 5–10× the GELSOL dose; as color remover, 250–600 ppm (25–60 g/hL; ≈2–5 lb/1,000 gal) or 790–1,900 mL/1,000 gal as liquid.

PACKAGING

25 kg pails.

SHELF LIFE & STORAGE

2 years; store at room temperature, dry; do not store below 5 °C.

CATALASI

Anti-oxidative “clean-up” blend

PRODUCT PROFILE

CATALASI is a blended fining agent containing bentonite, potassium caseinate, gelatin, L-ascorbic acid and potassium metabisulfite. It is used to cure or prevent oxidation in whites, rosés and reds, reducing browning, brick/yellow hues and oxidized phenolic bitterness. Potassium caseinate helps remove oxidized polyphenols and some metals, while the combined bentonite/protein fining compacts turbidity and lightens color; ascorbic acid and SO_2 provide antioxidant/antiseptic support.

BEST WAY OF APPLICATION

Because CATALASI contains both proteins and bentonite, it must be hydrated only in water and allowed to swell before use; direct hydration in wine causes the protein fraction to charge and bind phenolics immediately while the bentonite co-precipitates the same proteins. After swelling, add the slurry under tank turbulence or pump-over so it disperses fully before floc formation.

DOSAGE

200–500 ppm (20–50 g/hL; 1.5–4 lb/1,000 gal). 100 ppm (0.8 lb/1,000 gal) adds ≈5 ppm SO_2.

PACKAGING

1 kg packs; 20 kg bags.

SHELF LIFE & STORAGE

2–3 years; store at room temperature, dry, non-humid.

CATALASI AF Plus

Clarifier and stabilizer for white wines

PRODUCT PROFILE

CATALASI AF Plus is a clarifier based on bentonite, isinglass, pork/fish gelatin, PVPP and silica gel. It selectively removes green, bitter and reductive phenolics without relying on caseinate or albumin, making it suitable where allergen labeling is a concern. It is particularly effective for Pinot Grigio and high-phenolic whites/rosés, as well as reds showing harsh or reductive phenolics.

BEST WAY OF APPLICATION

Hydrate CATALASI AF Plus in water (never in wine), give it time to swell, then add under pump-over or strong mixing so the gelatin–bentonite–PVPP system disperses throughout the tank before flocs compact; hydrating directly in wine leads to immediate protein/bentonite co-flocculation and reduced efficiency.

ALLERGEN INFORMATION

Contains fish-derived and porcine fining agents (isinglass and gelatin) used exclusively as processing aids. During fining, these components bind phenolics and proteins and are removed by sedimentation, racking and/or filtration. When used according to recommended practices, no detectable allergenic residues remain in the finished wine; therefore, allergen labeling is not required in accordance with EU Reg. 1169/2011 and OIV/TTB guidelines.

DOSAGE

200–500 ppm (20–50 g/hL; 1.5–4 lb/1,000 gal).

PACKAGING

1 kg packets; 20 kg bags.

SHELF LIFE & STORAGE

2 years; store at room temperature, dry.

CATALASI Vega

Allergen free vegan complex clarifier

vegan ALLERGEN FREE

PRODUCT PROFILE
CATALASI Vega is a vegan fining blend based on vegetable proteins, PVPP, silica and activated bentonite. It provides one-step cleaning and stabilization of musts and wines, removing oxidized phenolics, reducing bitterness and improving protein stability and brilliance. Treated wines show fresher color, clearer expression of varietal character and improved stability over time.

BEST WAY OF APPLICATION
Hydrate the powder in water so that the vegetable proteins can unfold and the bentonite can swell, then introduce the slurry under tank turbulence; avoid hydrating directly in wine, where immediate protein charging and bentonite adsorption would reduce activity.

DOSAGE
Musts 50–100 g/hL (4–8 lb/1,000 gal); wines 20–60 g/hL, up to 100–150 g/hL in severe oxidative conditions.

PACKAGING
10 kg bags.

SHELF LIFE & STORAGE
2 years; store cool, dry, non-humid.

CHITO-F

Chitosan + fumaric acid

PRODUCT PROFILE
CHITO-F couples chitosan with fumaric acid to provide both antibacterial action and acidification. It is especially useful at the end of alcoholic fermentation to curb spoilage bacteria and help prevent malolactic restart in wines where MLF is not desired.

BEST WAY OF APPLICATION
Suspend CHITO-F in water, then add under tank turbulence after alcoholic fermentation, allowing good circulation so both the chitosan and fumaric acid phases contact the full wine volume before stabilization and racking.

DOSAGE
30–75 g/hL depending on bacterial load and desired effect.

PACKAGING
1 kg format.

SHELF LIFE & STORAGE
Store cool and dry.

CHITOCEL

Chitosan-based microbial & heavy-metal fining

PRODUCT PROFILE
CHITOCEL is based on fungal chitosan and yeast hulls. It reduces acetic and lactic bacteria, Brett, and other spoilage yeasts while also lowering iron, copper, lead and calcium to prevent metal casse and reduce ochratoxin A. Its positively charged chitosan interacts with negatively charged cell surfaces and may also bind to microbial DNA, damaging membranes and inhibiting growth; yeast hulls add deodorizing and adsorption capacity.

BEST WAY OF APPLICATION
Disperse CHITOCEL in water or wine and add under tank recirculation, ensuring homogeneous distribution throughout the volume to maximize microbial contact and metal binding.

DOSAGE
120–180 ppm (≈12–18 g/hL; 1–1.5 lb/1,000 gal).

PACKAGING
250 g packs.

SHELF LIFE & STORAGE
Store cool, dry, away from direct light and heat.

CHITOCEL Must

Must protection & antioxidant support

PRODUCT PROFILE

CHITOCEL Must is a chitosan preparation containing gallic and proanthocyanidin tannins, yeast hulls and autolysates rich in naturally occurring glutathione. It controls spoilage flora in musts, contributes antioxidant protection via GSH and tannins, and can aid protein stabilization and clarification through combined chitosan–tannin fining.

BEST WAY OF APPLICATION

Disperse in water or directly in must and add at the press pan or during tank filling so that the product is well mixed from the beginning of processing and remains in uniform suspension during settling or early fermentation.

DOSAGE

15–40 g/hL (≈1–3 lb/1,000 gal), mainly pre-fermentation.

PACKAGING

1 kg packets.

SHELF LIFE & STORAGE

Store cool, dry, away from heat and light.

CRYSTALFLASH

Cold-stabilization accelerator

PRODUCT PROFILE

CRYSTALFLASH is a blended seeding system containing potassium bicarbonate, cream of tartar, bentonite, neutral potassium tartrate (tartaric acid) and cellulose. In cold stabilization, it generates a dense cloud of micro-crystals that kick-start nucleation of potassium bitartrate and neutral calcium tartrate, shortening cold-hold times and reducing oxidative risk during refrigeration. Bentonite in the blend improves compaction of crystals and lees. Bench trials (mini cold tests) at 20 and 40 g/hL equivalents are recommended; evaluate tartrate stability (e.g., freeze test) and sensory after racking.

BEST WAY OF APPLICATION

Add CRYSTALFLASH directly to the cold wine under gentle recirculation or pump-over, allowing the seeding cloud to disperse uniformly through the tank before holding at the chosen stabilization temperature and racking off the compacted crystals.

DOSAGE

20–40 g/hL (≈1.5–2.5 lb/1,000 gal).

PACKAGING

1 kg packets.

SHELF LIFE & STORAGE

4 years; store cool, dry, non-humid.

DECORAN Gran

Mini-pellet decolorizing carbon

PRODUCT PROFILE

DECORAN Gran is a highly active decolorizing carbon produced by controlled carbonization and activation, then micropelletized into mini-pellets. It is ideal for removing excess color and reducing levels of polyphenols and catechins in musts and wines, with a surface area >1,000 m²/g and pore size tuned to adsorb higher-molecular-weight colored phenolics while limiting impact on lower-weight aroma compounds. The mini-pellet format minimizes dust, reduces product loss and makes handling faster and cleaner in the cellar.

BEST WAY OF APPLICATION

Dissolve DECORAN Gran in must, wine or water at roughly 1:10, then add to the tank under pump-over or strong mixing so the pellets disperse and disintegrate into an active carbon cloud; after the desired contact time, remove by filtration or sedimentation, optionally in combination with SPINDASOL, GELSOL or BENTOGRAN for compaction.

DOSAGE

5–100 g/hL depending on degree of decolorization desired.

PACKAGING

15 kg bags.

SHELF LIFE & STORAGE

Store cool, dry, away from light and direct heat.

DECORAN XL

High-capacity powdered decolorizing carbon

PRODUCT PROFILE

DECORAN XL is a super-active powdered decolorizing carbon with a surface area >1,000 m²/g and pore size distribution suited to removing colored polyphenols and other high-molecular-weight compounds in musts and wines. It is designed for large-volume treatments where strong, efficient color correction is required with very good adsorption capacity per unit dose.

BEST WAY OF APPLICATION

Dissolve DECORAN XL in must, wine or water at about 1:10 and add to the tank in recirculation so the slurry disperses completely; after adsorption of color components, remove by filtration or sedimentation/ clarification, optionally with SPINDASOL, GELSOL or bentonite to compact the carbon lees.

DOSAGE

5–100 g/hL according to the required decolorization.

PACKAGING

10 kg bags.

SHELF LIFE & STORAGE

Store cool, dry, away from direct light and heat.

DEACID

Potassium bicarbonate / tartrate blend

PRODUCT PROFILE

DEACID is a highly soluble blend of potassium bicarbonate and neutral potassium tartrate designed to reduce total acidity and raise pH in a controlled way, without stripping aromatics. It neutralizes excess tartaric acidity and promotes rapid precipitation of potassium salts. Used carefully, it softens aggressive acidity in whites and rounds out reds while preserving freshness. Bench trials are essential: in the lab, add increasing amounts calculated from ≈130 g/hL per 1 g/L TA reduction (tartaric), then chill and check pH/TA and sensory profile; when scaling up, watch for CO_2 release and volume expansion.

BEST WAY OF APPLICATION

Dissolve the required dose completely in a small volume of water or wine, then add to the tank under circulation so the reaction and CO_2 release are evenly distributed; chill, allow salts to precipitate and re-check pH, TA and sensory profile before finalizing the treatment.

DOSAGE

≈130 g/hL to lower TA by 1 g/L; higher additions require bench trials.

PACKAGING

5 kg and 25 kg bags.

SHELF LIFE & STORAGE

2 years; store cool, dry, non-humid.

DESULFIN

Liquid copper for reductive faults

PRODUCT PROFILE

DESULFIN is a stabilized liquid copper sulfate solution formulated for precise additions to treat H_2S and light mercaptan reduction. In wines with closed, “reduced” characters, a drop test in the glass can quickly confirm whether copper is appropriate. Copper binds sulfur compounds, forming insoluble Cu-sulfides / Cu-mercaptides that can be removed by racking or filtration. For mercaptans, DESULFIN is used at roughly twice the rate needed for simple H_2S; for DMDS/DEDS faults, temporary conversion back to mercaptans with ascorbic acid may be needed before copper treatment.

BEST WAY OF APPLICATION

Dilute the calculated dose in a small volume of wine and add under tank recirculation so the copper disperses uniformly; allow time for Cu-sulfide formation, then rack or filter and confirm residual copper is within legal limits. Bench trials: one average drop (≈0.05 mL) into 1 L ≈ 50 ppm; taste and smell after gentle mixing. Run several levels around 100 ppm and check sensory and residual copper (target <1 mg/L).

DOSAGE

Typically around 100 ppm; never exceed the TTB maximum of 6 mg/L copper in wine and ensure final Cu ≤1 mg/L. Ten mL/hL DESULFIN contributes ≈0.25 mg/L Cu; practical maximum ≈40 mL/hL assuming no pre-existing copper.

PACKAGING

1 kg bottles.

SHELF LIFE & STORAGE

Shelf life & storage: 2 years; store at room temperature, dry; protect from frost (<5 °C / 41 °F).

FREE4FENOL

Volatile phenol carbon blend

PRODUCT PROFILE

FREE4FENOL is a tailored blend of activated deodorizing carbons specifically formulated to reduce volatile phenols such as 4-vinylphenol, 4-vinylguaiacol, 4-ethylphenol and 4-ethylguaiacol. These compounds are associated with “smoke-taint”, “pharmaceutical/adhesive,” barnyard, horse-sweat and medicinal notes. The activation protocol minimizes adsorption of high-molecular-weight pigments, giving strong deodorizing power with minimal color loss in reds.

BEST WAY OF APPLICATION

Prepare a 1:10 slurry in water, then add to must or wine in recirculation, maintaining homogenization long enough for the entire volume to contact the carbon (re-mix after ~24 hours if needed). Ensure free SO_2 is at least around 15 mg/L to support microbial stability during treatment.

DOSAGE

10–80 g/hL; in practice, ≈70 g/hL reduced volatile phenols from 185 μg/L to 80 μg/L in white wine trials.

PACKAGING

20 kg bags.

SHELF LIFE & STORAGE

Store cool, dry, away from light and heat.

GELSOL

Liquid gelatin clarifier

PRODUCT PROFILE

GELSOL is an enzymatically prepared, irreversibly hydrolyzed liquid pork gelatin designed for rapid flocculation and compact sediment formation. It is used alone or with SPINDASOL/CARBOSIL for must clarification in cold settling or flotation, and in reds and rosés to soften tannins and reduce bitterness without stripping color (low affinity for anthocyanins). Being liquid and never dried, GELSOL maintains high activity and avoids formation of re-condensed “footballs” in tanks.

BEST WAY OF APPLICATION

Dose GELSOL directly into must or wine during pump-over, flotation or active mixing so it disperses quickly; when used with silica or CARBOSIL, add GELSOL first and add the silica/CARBOSIL after gelatin dispersion for optimal floc formation.

DOSAGE

Must clarification 100 ppm; red/rosé fining starting around 30 ppm, adjusted via trial.

PACKAGING

25 kg pails, 250 kg drums, 1200 kg totes.

SHELF LIFE & STORAGE

2 years; store at room temperature, dry; avoid temperatures below 5 °C.

LYSOCID W

Lysozyme for LAB control

PRODUCT PROFILE

LYSOCID W is a purified lysozyme enzyme from egg-white albumin that selectively lyses Gram-positive bacteria (*Oenococcus, Pediococcus*, *Lactobacillus*) while leaving yeast and Gram-negative bacteria largely unaffected. It is used to prevent or slow MLF, control Lactobacillus during sluggish ferments, or stabilize wines with residual sugar.

BEST WAY OF APPLICATION

Dissolve carefully in warm water (never directly in wine) to avoid foaming and denaturation, then add under pump-over or circulation to ensure uniform distribution through the tank.

DOSAGE

Prevention 10–25 g/hL (1–2 lb/1,000 gal); corrective/stabilization 25–40 g/hL (2–3 lb/1,000 gal).

PACKAGING

1 kg packs.

SHELF LIFE & STORAGE

2 years; store cold in a dry, non-humid environment.

MICROCEL

Fermentation-phase caseinate/bentonite fining

PRODUCT PROFILE

MICROCEL is a complex clarifier for fermenting white and rosé musts. It contains potassium caseinate, active cellulose fibers and micronized pharmaceutical bentonite. Added at the start of fermentation, it adsorbs oxidizable proanthocyanidins and catechins and removes a significant fraction of unstable proteins, limiting browning and reducing the need for heavy post-fermentation bentonite additions. Wines show greener/cleaner hues and more persistent varietal aromas.

BEST WAY OF APPLICATION

Hydrate MICROCEL in water and allow swelling, then add at the beginning of fermentation during tank filling or early pump-overs so the fining components disperse uniformly in the must while it is still highly mobile.

DOSAGE

200–500 ppm (20–50 g/hL; 1.5–4 lb/1,000 gal).

PACKAGING

10 and 25 kg bags.

SHELF LIFE & STORAGE

3 years; store at room temperature in a dry environment.

MICROCEL AF

Allergen-free fermentation fining

ALLERGEN FREE

PRODUCT PROFILE

MICROCELAF mirrors MICROCEL's concept but replaces potassium caseinate with PVPP, plus bentonite and activated cellulose. It reduces catechins and oxidizable phenolics, limiting yellow/orange and reductive notes in finished wines while being free of milk-derived allergens.

BEST WAY OF APPLICATION

Prepare as a slurry in water and add in the early stages of fermentation under tank circulation, ensuring the fining system is distributed throughout the fermenting must.

DOSAGE

200–500 ppm (20–50 g/hL; 1.5–4 lb/1,000 gal).

PACKAGING

25 kg bags.

SHELF LIFE & STORAGE

3 years; store cool, dry.

MICROCID

Sorbate-based antimicrobial & antioxidant

PRODUCT PROFILE

MICROCID is a balanced formulation based on potassium sorbate and antioxidant components (citric acid, potassium metabisulfite, ascorbic acid). The ingredients act synergistically to protect wines and special wines against unwanted refermentation and oxidative spoilage. Potassium sorbate provides broad fungicidal and fungistatic action, inhibiting yeasts responsible for refermentation in sweet wines, while the antioxidant fraction stabilizes free SO_2 and limits the formation of "geranium" off-odors by keeping lactic bacteria in check.

BEST WAY OF APPLICATION

Dissolve the dose in about 10 parts lukewarm water and add evenly to a well-clarified, well-filtered wine (low microbial load) under tank recirculation.

DOSAGE

Around 50 g/hL (providing roughly 200 mg/L sorbic acid and ~45 mg/L SO_2).

PACKAGING

500 g sachets in 15 kg cartons.

SHELF LIFE & STORAGE

Store cool, dry, away from light and heat.

MICROCID F

Re-fermentation control with fumaric acid

PRODUCT PROFILE

MICROCID F combines potassium sorbate with fumaric acid (plus supporting ingredients) to prevent re-fermentation in wines containing residual sugar. Fumaric acid helps inhibit lactic bacteria that could otherwise convert sorbate into off-aroma compounds (e.g., "geranium" character), giving a more secure microbiological outcome and a slight acid "tightening".

BEST WAY OF APPLICATION

Dissolve MICROCID F completely in a small volume of lukewarm water, then add to sterile-filtered sweet wines under active recirculation so it mixes quickly and homogeneously before bottling.

DOSAGE

25–60 g/hL (2–5 lb/1,000 gal).

PACKAGING

1 kg packets.

SHELF LIFE & STORAGE

2 years; store cool, dry, non-humid.

NEW-CEL & NEW-CEL +17

CMC tartrate stabilizers

PRODUCT PROFILE

NEW-CEL and NEW-CEL +17 are sodium carboxymethyl-cellulose (CMC) solutions used to prevent potassium bitartrate precipitation without refrigeration. CMC works by forming a thin protective layer on micro-crystals, deforming their structure and inhibiting further crystal growth. It is particularly valuable for wines destined for warm-chain distribution or bottling lines where cold stabilization presents logistical or oxidative risk. Because CMC interacts with unstable colloids, correct application conditions are critical to ensure stability and avoid post-dosing haze or flocculation. CMC selectively blocks KHT crystal growth but does not remove tartrate salts, preventing recrystallization while reducing energy cost relative to cold stabilization. CMC is anionic and can interact with borderline-stable proteins, unstable red pigments and residual polysaccharide colloids, so the wine must be fully stable and filtered before addition.

BEST WAY OF APPLICATION

- Protein-stable (passed heat test), iron/copper stable, no residual fermentation activity, filtered to ≤ 1 NTU (preferably ≤ 0.6 NTU), microbially stable or prepared for sterile filtration.
- Ideal wine temperature: 12–18 °C (54–64 °F). Avoid dosing below 10 °C (50 °F); low temperature increases colloid reactivity and haze risk. Avoid dosing above 22 °C (72 °F); high temperature may reduce protection efficiency.
- Add after final filtration (or immediately prior to sterile filtration). Stir or circulate gently for complete homogenization. Avoid aggressive pump-shear or high-speed mixing. Allow 24–48 hours rest before bottling when possible.
- Do not combine immediately with gum Arabic, mannoproteins, gelatin / silica fining, PVPP or caseinate; perform these operations before CMC.
- Avoid use on young, anthocyanin-rich reds unless color is already stable.

Bench Trial Protocol (Strongly Recommended). Perform trials on filtered wine.
Warm samples to ≈16 °C (60–62 °F)
Trial two rates:

- NEW-CEL: 100 & 150 g/hL
- NEW-CEL +17: 12 & 40 g/hL

Mix gently and allow 12–24 hours rest.
Run: mini cold test or freeze test, protein haze check, visual flocculation observation and taste for mouthfeel or bitterness shift.
If borderline results appear → prefer lower addition rate + tighter filtration.

DOSAGE

NEW-CEL 100–150 g/hL (≈8–12 lb/1,000 gal); NEW-CEL +17 12–60 g/hL (≈1–5 lb/1,000 gal), using the lowest effective rate confirmed by bench trial.

PACKAGING

1 kg bottles and 25 kg pails.

SHELF LIFE & STORAGE

1 year in sealed original container; store at room temperature, dry, frost-free, and mix before use; do not store below 5 °C (41 °F).

PROTECT-F

Fumaric acid antimicrobial & oxidative protection system

PRODUCT PROFILE

PROTECT-F is a multifunctional protective treatment based on food-grade fumaric acid (E297) blended with gall-nut and quebracho proanthocyanidins. It is designed to inhibit lactic acid bacteria (LAB) and delay or block unwanted malolactic fermentation, while also contributing antioxidant support and a light acid-tightening effect in musts and wines. The product is intended as an alternative to lysozyme and SO_2-dependent strategies in wines with elevated pH or reduced-SO_2 programs, particularly where microbial stability must be achieved without compromising aromatic freshness.

BEST WAY OF APPLICATION

Disperse PROTECT-F in water and add under pump-over or tank recirculation so it rapidly disperses throughout the must or wine; when used pre-AF, dose into the filling stream or early pump-overs, and when used post-AF, prefer clarified wines with well-managed SO_2 and allow sufficient contact time before racking or bottling.

DOSAGE

100–600 ppm depending on contamination level, wine pH and stability target.

PACKAGING

1 and 5 kg packs.

SHELF LIFE & STORAGE

Store cool, dry, away from moisture and heat; keep sealed to preserve organic-acid reactivity.

How fumaric acid interacts with lactic acid bacteria

The antimicrobial mode of action includes two complementary inhibition pathways:

- Bacteriostatic & bactericidal action on Gram+ LAB
  Undissociated fumaric acid crosses the cell membrane under wine pH and once inside the cell, dissociation causes intracellular acidification. This disrupts osmotic balance and energy metabolism, finally LAB must consume ATP to restore proton balance, exhausting the cell.
- Macromolecular destabilization & membrane interaction
  Fumaric acid can denature cellular proteins and DNA (Salmond et al., 1984) and interact at the membrane level causing permeability loss (Tango et al., 2014).

The result is a combined bacteriostatic effect at moderate doses and a bactericidal effect at higher additions, where PROTECT-F additions produce rapid suppression and near-complete population collapse in both high- and low-microbial-load wines.
Beyond antimicrobial control, PROTECT-F also contributes with antioxidant capacity derived from Acacia & Quebracho proanthocyanidins and inhibition of oxidative enzymes such as laccase and tyrosinase when applied early in AF.

Recommended scope of application

PROTECT-F may be applied: at the beginning of alcoholic fermentation to “clean” the must from LAB spoilage, keeping in mind that most of the activity will be depleted by the end of fermentation; or after AF when the priority is ML inhibition and cleanliness.

QUICKGEL AF

Rapid clarifier of very cloudy wines

PRODUCT PROFILE	QUICKGEL AF is a fast-acting clarifier based on pork and fish gelatin plus activated bentonite. It is designed for quick clarification of cloudy juices and wines, producing bright, soft wines with very compact lees and no significant loss of color in reds. The gelatin–bentonite "net" captures phenolics, proteins and colloids efficiently, allowing filtration as soon as 48 hours after treatment.
BEST WAY OF APPLICATION	Hydrate only in water and allow the gelatin–bentonite system to swell, then add the slurry to wine under strong turbulence or pump-over so it disperses rapidly and evenly before flocculation; avoid hydrating in wine to prevent immediate co-precipitation.
DOSAGE	300–900 ppm (30–90 g/hL; 2.5–6 lb/1,000 gal).
PACKAGING	500 g packets; 10 kg bags.
SHELF LIFE & STORAGE	2 years; store at room temperature, dry.

SPINDASOL W

Liquid silica for compaction

PRODUCT PROFILE	SPINDASOL W is a liquid silica sol used to compact settling agents and carbon finings. When combined with bentonite or gelatin, it increases floc density, speeds settling and reduces lees volume without impacting aroma or color, due to its negative charge. It is also used with CARBOSIL or GELSOL to improve flotation or clarification yields.
BEST WAY OF APPLICATION	Add SPINDASOL W after the protein or primary fining agent, into a gently circulating tank, so the silica contacts existing flocs and compacts them without excessive shear that might break them apart. Bench trials: add SPINDASOL W at 3–10× the protein fining dose (e.g., relative to GELSOL) in lab tests and evaluate speed and compactness of settling.
DOSAGE	Typically, 3–10× the weight of the primary fining agent.
PACKAGING	Liquid format in pails of 25 kg and drums of 230 kg.
SHELF LIFE & STORAGE	Store cool, frost-free, and mix before use.

STERYL Fusti*

Anti flor (pichia) tablets for barrels

PRODUCT PROFILE	STERYL Fusti tablets consist of a solid paraffin support containing about 1.7% allyl isothiocyanate, a volatile compound with very high antiseptic power against aerobic microorganisms. The tablets float on the wine surface in barrels, slowly releasing allyl isothiocyanate to sterilize the headspace air. This prevents "flor" (fioretta) formation by oxidative yeasts, limiting alcoholic loss and acetaldehyde build-up responsible for "acetic/oxidized" notes.
BEST WAY OF APPLICATION	Add one STERYL Fusti tablet to each barrel to be protected; for larger containers, low-alcohol wines or partially filled vessels, increase the number of tablets as needed. Renew tablets when their action is deemed exhausted, particularly in warm conditions. Average every two weeks.
DOSAGE	One tablet per barrel (fusto) as a starting point.
PACKAGING	Boxes with 40 sachets, each containing 2 tablets (≈7 g each).
SHELF LIFE & STORAGE	Store cool, dry, away from light and heat; sealed laminated foil packaging ensures long-term stability.

STERYL Vasche*

Anti flor (pichia) tablets for tanks

PRODUCT PROFILE
STERYL Vasche tablets are similar to STERYL Fusti but formulated with about 2% allyl isothiocyanate to treat larger tanks. Floating on the surface, they slowly release the volatile antiseptic into the headspace, preventing *Pichia* yeast growth and other oxidative surface alterations in bulk storage vessels.

BEST WAY OF APPLICATION
Place one STERYL Vasche tablet in each tank to be protected; for very large tanks, partially filled vessels or low-alcohol wines, add additional tablets proportionally. Renew periodically according to headspace volume, closure system and storage temperature.

DOSAGE
One tablet per tank as a base rate.

PACKAGING
50 sachets with one tablet each (≈20 g).

SHELF LIFE & STORAGE
Store cool, dry, away from light and heat.

VE-GEL

Powdered vegetable protein clarifier

vegan ALLERGEN FREE

PRODUCT PROFILE
VE-GEL is a powdered clarifier based on pea proteins and inactivated yeast, developed as an alternative to animal-origin proteins for the clarification of musts and wines. The synergy between plant proteins and yeast components makes it particularly effective for difficult-to-clarify musts and wines, especially when combined with inorganic fining agents such as SPINDASOL or BENTOGRAN. It provides rapid clarification with compact lees, high clarity and shorter settling times than standard vegetable proteins.

BEST WAY OF APPLICATION
Dissolve VE-GEL in about 15 parts water and add inline or under tank recirculation, ideally in combination with silica/bentonite for enhanced compaction when required.

DOSAGE
100–500 ppm.

PACKAGING
1 kg sachets (boxes of 15 kg) and 20 kg bags.

SHELF LIFE & STORAGE
Store cool, dry, away from light and direct heat.

VE-GEL Liquid

Liquid vegetable protein for flotation

vegan

PRODUCT PROFILE
VE-GEL Liquid is a ready-to-use liquid clarifier based on selected pea proteins and activated bentonite, stabilized with citric acid and potassium bisulfite. The degree of hydrolysis and molecular weight distribution give the protein a hydrophobic character ideal for binding condensed polyphenols and forming flocs that trap bitter, astringent tannins and oxidized quinones. Its rapid flocculation and foam properties make it an excellent flotation aid, especially where non-animal alternatives are required.

BEST WAY OF APPLICATION
Shake well before use, then inject VE-GEL Liquid with a Venturi tube or dosing pump (optionally diluted 1:2) into must undergoing flotation or cold settling, homogenizing the tank. On AEB E-FLOT systems the product can be aspirated directly from the container via peristaltic pump.

DOSAGE
300–1500 ppm.

PACKAGING
8 kg and 20 kg canisters.

SHELF LIFE & STORAGE
Store cool, dry, away from light and heat.

** not in the TTB list of products allowed in winemaking.*


08

Filtration

Filtration solutions

Pre-filters, membranes, pads and process adjuvants

Filtration is a **critical step in modern winemaking, ensuring microbiological stability and shelf life while preserving sensory integrity**. When correctly designed, filtration protects wine from spoilage organisms and refermentation without stripping aroma, texture, or varietal expression. Conversely, excessive or poorly managed filtration can reduce wine volume, flatten mouthfeel, and accelerate oxidative fatigue.

The key to successful filtration lies in **proper staging, correct flow management**, and selecting the **appropriate materials and porosities** for each step. Filtration should be approached as a progressive clarification process rather than a single, aggressive intervention.

Preparing wine for final filtration

Before sterile filtration, wine must be physically and colloidally stable. Traditional sheet and earth filtration systems have long been used for this purpose, but many wineries now seek alternatives that offer greater flexibility, lower waste, and improved hygienic control.

M3 HIGH PERFORMANCE 2.0

PRODUCT PROFILE

High-capacity cartridge prefiltration

Powered by DANMIL

The M3 HIGH PERFORMANCE 2.0 cartridge is designed as an alternative to sheet and earth filtration during wine preparation. Its radial pleated design provides a very large effective filtration surface, allowing depth filtration with high solids retention and extended service life.

Key advantages include:

- high retention of suspended solids and colloids
- fewer cartridges and O-rings, reducing bypass risk
- faster element replacement
- significantly lower disposal volume compared to equivalent surface-area cartridges
- broad chemical compatibility for regeneration.

Each M3 cartridge offers a filtration surface of approximately 18 m² (194 ft²) and can operate at flows up to 45 hL/h (≈1,200 gal/h) per cartridge. Typical staging consists of three steps (5 – 2 – 1 μm), with flow capacity increased by installing multiple housings per stage.

M3 cartridges are washable in counterflow, regenerable with hot water (up to 80 °C / 176 °F), steam sterilizable (up to 121 °C / 250 °F), and compatible with alkaline detergents and peroxide. Maximum operating differential pressure is 3.4 bar (50 psi).

Polypropylene prefiltration

Protecting final membranes

To protect final PES membranes, a polypropylene prefiltration stage is essential. These cartridges retain residual colloids and fine particles that would otherwise prematurely foul the final membrane.
For 30-inch cartridges, the recommended flow is approximately 1,000 L/h (≈265 gal/h) per cartridge. Maintaining this conservative flow prevents colloid forcing and ensures that final membranes can reach service lives of up to 150,000 L (≈40,000 gal) per cartridge.

ABSOLUTE PP MEMBRAN PROTECT

PRODUCT PROFILE

Powered by DANMIL

When filtering through a 0.45 µm final membrane, AEB recommends installing a tighter prefilter such as ABSOLUTE PP MEMBRAN PROTECT (0.40 µm). This is particularly important when turbidity readings remain unchanged before and after standard prefiltration, indicating insufficient particle removal.

The ABSOLUTE PP MEMBRAN PROTECT consists of six polypropylene layers and is designed for frequent chemical regeneration. Additional ABSOLUTE PP options are available in 0.6, 1, 3, 5 and 10 µm porosities to suit different wine conditions.

Final filtration

ABSOLUTE PES PLUS membranes

ABSOLUTE PES PLUS

(polyethersulfone) final membranes

PRODUCT PROFILE

Powered by DANMIL

ABSOLUTE PES PLUS membranes are asymmetric, hydrophilic polyethersulfone membranes designed for absolute retention and repeated integrity testing. Their hydrophilicity ensures rapid wetting, a critical requirement for reliable integrity tests.

Key characteristics include:
- broad chemical resistance (acids, bases, oxidants)
- thermal stability allowing hot water sanitation (80 °C / 176 °F) and steam sterilization (121 °C / 250 °F)
- suitability for alkaline and peroxide regeneration
- no electrical charge, minimizing wine–membrane interactions.

When properly protected by upstream prefiltration, ABSOLUTE PES PLUS membranes routinely achieve service volumes of ≈150,000 L (40,000 gal) per cartridge.

Available porosities:
- 0.2 µm (sterilizing)
- 0.45 µm (standard bottling)
- 0.65 µm, 0.8 µm, 1.2 µm (polishing and stabilization).

Integrity testing of ABSOLUTE PES membrane filters

Integrity testing is a **fundamental control step in winery filtration**, ensuring that absolute membrane cartridges are intact, correctly installed, and capable of providing true **microbiological security**. Rather than measuring filtration efficiency directly, integrity tests verify the **physical continuity of the membrane and the absence of defects**, oversized pores, or damage that could allow microbial passage.

ABSOLUTE PES PLUS membranes are specifically engineered for repeated integrity testing and are fully validated both as individual elements and as assembled cartridges prior to delivery. Integrity testing must be performed before critical filtration (e.g. pre-bottling), after regeneration, and whenever microbiological stability is required.

Integrity testing verifies that a membrane cartridge is **correctly installed, fully wetted and free from defects before and after filtration**. Two complementary physical principles are used in winery practice: bubble point and diffusion (pressure decay or flow) testing. While different test instruments may display results in different formats or units, the underlying acceptance criteria are membrane-specific and must always be referenced to the manufacturer's validated limits.

Bubble Point test: structural integrity confirmation

The bubble point test determines the **minimum gas pressure required to displace liquid** from the largest pores of a fully wetted membrane.
Below the bubble point, gas can pass only by molecular diffusion through liquid-filled pores. When the applied pressure exceeds the bubble point, liquid is expelled from the largest pores and a continuous stream of bubbles becomes visible downstream.

This test confirms:
- **absence of membrane rupture** or gross defects
- **correct pore size** distribution
- **complete wetting** of the membrane.

Measured values below the thresholds listed in the chart "Integrity Test Parameters" indicate incomplete wetting, incorrect installation or membrane damage and require corrective action before filtration.
While the bubble point test is highly effective for structural verification, it is typically used during qualification or troubleshooting rather than routine cellar checks.

Diffusion / pressure decay test: quantitative winery standard

The diffusion (or pressure decay) test is the **most widely used integrity method in wineries**, as it is quantitative, reproducible and easily automated.
When a fully wetted membrane is pressurized below its bubble point, gas cannot form bubbles and can pass only by molecular diffusion through liquid-filled pores. The diffusion rate is predictable and depends on:
- membrane surface area
- pore structure
- applied pressure
- test duration
- gas type.

Any membrane defect increases gas passage and appears as an excessive pressure drop over time. For ABSOLUTE PES PLUS membranes, the maximum allowable pressure decay is calculated using the following validated relationship:

Maximum Pressure Drop = (D × T × N × P) / V

Where:
- D = diffusion coefficient of ABSOLUTE PES PLUS indicated in the chart “Integrity Test Parameters”
- T = test duration (standard: 2 minutes)
- N = number of 10” modules (each 30” cartridge = 3 modules)
- P = test pressure
- V = free volume of the housing (housing internal volume minus cartridge displacement).

Volume correction factors:
- Each 10” ABSOLUTE PES PLUS module displaces 853 mL
- Each 30” cartridge displaces 2,559 mL.

POROSITY		0.2 µm	0.45 µm	0.65 µm	0.8 µm	1.2 µm
BUBBLE POINT	bar	3.1	1.7	1.2	1.0	0.8
	psi	44	24	17	14	11
PRESSURE TEST	bar	2.5	1.4	1.0	0.8	0.6
	psi	36	20	14	11	8
MAX. DIFFUSION FLOW FOR MODULE (AIR)	ml/min	25	25	25	25	25
MAX. DIFFUSION FLOW FOR MODULE (NITROGEN)	ml/min	23	23	23	23	23

Integrity Test Parameters

Diffusion flow test: absolute gas flow measurement

Some integrity testers measure diffusion directly as gas flow (mL/min) rather than pressure decay. This method relies on the same physical principle but reports results as absolute flow values.
ABSOLUTE PES membranes are characterized by very tight and consistent diffusion limits, independent of nominal pore size.

Microbiological relevance of integrity testing

Integrity testing directly correlates with microbiological retention. ABSOLUTE PES PLUS membranes are validated according to HIMA standards and achieve LRV ≥ 7, qualifying them as hygienizing filters for wine applications.

Validated retention includes:
- *Oenococcus oeni*
- *Lactobacillus* spp.
- *Acetobacter* spp.
- *Brettanomyces*
- *Saccharomyces cerevisiae.*

At 0.45 µm and 0.2 µm, ABSOLUTE PES PLUS membranes provide full microbiological security for pre-bottling filtration when integrity is confirmed.

Practical winery considerations
- Membranes must be fully wetted before testing (water or compatible solution).
- Test temperature should be stable, as diffusion increases with temperature.
- Integrity testing must be performed after CIP, after sterilization, and before bottling.
- Failed integrity tests indicate physical damage, chemical degradation, incomplete wetting, or incorrect assembly and must be resolved before filtration.

Washing, regeneration and sanitation of membrane cartridges

Proper washing and regeneration **are essential to preserve filtration performance**, extend cartridge lifespan, and ensure reproducible integrity test results. PES and polypropylene (PP) cartridges are designed to withstand repeated chemical and thermal regeneration cycles when correct procedures, temperatures, pressures, and chemicals are respected. Regeneration aims primarily at removing soluble organic fouling (proteins, polysaccharides, β-glucans, colloids) rather than inorganic particles, which should be minimized upstream through appropriate pre-filtration and process water treatment.

Washing procedures must always respect the maximum operating temperature and differential pressure of each cartridge type to avoid irreversible damage to the membrane structure.

A standard regeneration cycle begins with rinsing in the direction of filtration using pre-filtered cold water at a flow rate 1.5–2 times higher than nominal wine flow. This initial step removes loosely bound residues and is critical to prevent "protein cooking" when subsequent hot water or alkaline washes are applied. The wash is then continued with warm or hot water (typically 50–80 °C - 122–176 °F), which improves solubilization of organic foulants while remaining within the thermal limits of PES and PP membranes.

When chemical regeneration is required, compatible agents include:
- **Alkaline detergents** (**MEMBRAN UF**) for organic fouling,
- **Oxidative agents** such as hydrogen peroxide (**REMOXAN**) or peracetic acid (**PERACID**) for microbial control and stubborn organic residues.

Sequential alkaline followed by oxidative treatments are particularly effective, as alkalinity solubilizes proteins and polysaccharides while oxidants break down residual organic films. Contact times, temperatures, and concentrations must be carefully controlled, as excessive exposure can reduce membrane elasticity and mechanical strength over time.

Counter-current washing can significantly enhance regeneration efficiency by mechanically dislodging trapped material, but it is recommended only for depth and pre-filters. For absolute membrane cartridges, counter-current washing, especially with hot water, should be avoided.

Ozone (not recommended)

Polyethersulfone (PES) by itself is naturally hydrophobic, which means it doesn't wet easily with water. To make PES membranes suitable for wine and other aqueous applications, manufacturers blend in PVP. This additive gives the membrane its hydrophilic character, ensuring the cartridge wets consistently, can be integrity tested with water, and performs reliably during filtration.

The challenge is that PVP is sensitive to strong oxidants like ozone. A study by Hanafi et al. (Environmental Science & Technology, 2014) showed that when PES/PVP membranes are exposed to oxidants, the PVP undergoes oxidation and degradation. When this happens, two things can occur:
- loss of hydrophilicity, the membrane becomes harder to wet, which can make the bubble-point or diffusion test appear to fail even if the pores are structurally intact
- structural changes, in some cases, oxidized PVP leaches out or cross-links, leading to real changes in pore size and a genuine loss of retention.

Sometimes, soaking a cartridge in an ethanol/water solution before testing can help temporarily restore wetting. If the cartridge passes the integrity test after this ethanol pre-wet, it suggests the failure was largely due to loss of hydrophilicity rather than major pore damage. However, it's important to stress that this is not a repair. The ethanol doesn't undo the oxidation, it only forces wetting for the test. Once PVP is chemically damaged, the change is permanent.

For this reason, ozone sanitation is best applied upstream of the filter housing, with a neutralization step before ozonated water reaches the cartridges. Alternatively, sanitizers such as peracetic acid or hot water are often recommended in wine filtration.

Storage after regeneration

For short-term storage, cartridges may be kept wet using suitable sanitizing solutions (citric acid–SO_2, peracetic acid, hydrogen peroxide, or ethanol) to prevent microbial growth. For long-term storage, cartridges should be fully drained, dried using sterile filtered air or nitrogen, and stored in clean, sealed packaging. In all cases, integrity testing before reuse is mandatory to confirm membrane performance and safety.

By following these regeneration principles, PES and PP cartridges can undergo multiple regeneration cycles while maintaining filtration efficiency, microbiological safety, and compliance with integrity specifications.

DFR (Depth Filtration Range) pads

Pads and modules are designed for the filtration of liquids such as wine, oil, beer and juices.
DFR (Depth Filtration Range) sheets are made of natural, first choice and particularly pure materials, carrying a cationic charge. They are made of cellulose finely shined broadleaf and conifer fibers, kieselguhr and perlite at different concentrations.

AEB DFR 110 / 130

Sterilizing filtration with reduction of microorganisms

CHARACTERISTICS

Narrow-pored structure of the filter media, combined with an electrokinetic potential with adsorption action (charged) to yield a high rate of microbiological retention

APPLICATIONS

In sterile cold bottling, in order to improve the shelf life of wines, beer and juices.

As pre-filters upstream of membrane filtration, thanks to the high retention capacity of colloidal components.

AEB DFR 50 / 70

Filtration with reduction of microorganisms and microfiltration

CHARACTERISTICS

They allow to reach high levels of clarification for their effective retention capacity of the finest particles and microorganisms.

APPLICATIONS

Storage and bottling of microbiologically stable wines.

AEB DFR 30

Rough, polishing filtration

CHARACTERISTICS

They have a high-volume hollow structure and a high turbidity absorption capacity.

APPLICATIONS

Polishing of the product, be it wine, beer, oil or juices.

Applications for different pads

SHEET	POROSITY	THICKNESS (MM)	TEAR RESISTANCE IN WET STATE (PSI)	WATER FLOW RATE DELTA P AT 14.5 PSI (L/M²/MIN)
AEB DFR 30 (matches Steril 300 XL)	5-12 micron	3.8	>7.2	350-400
AEB DFR 50 (matches Steril 500 L)	3-6 micron	3.8	>7.2	200-240
AEB DFR 70 (matches Steril 700 L)	1.5-3 micron	3.8	>7.2	160-200
AEB DFR 110 (matches Steril 1100)	0.5-0.8 micron	3.8	>11.6	68-80
AEB DFR 130 (matches Steril 1400)	0.4 - 0.6 micron	3.9	>7.2	42

Pads porosity, thickness, resistance and permeability

Pads sterilization (optional)

Pads can be sterilized with hot water or saturated steam at a maximum temperature of 134°C-273°F, during this phase it is necessary to loosen the compressed filter pack slightly and make sure that the complete sterilization of the entire filter system is carried out. Final compression should only be performed after the cooling of the filter pack.

Pads sterilization with hot water.	
Flow rate must be similar to the one used in operations.	
The water must be demineralized and free from impurities.	
Temperature	80°C 176°F
Duration	Half hour after temperature has been reached
Pressure	At least 0.5 bar or 7.2 psi at the outlet

Pads sterilization

Steam sterilization of pads	
The steam must be free from impurities	
Temperature	134°C 273°F
Duration	20 minutes starting from when all the valves are steaming
Wash	50 liters/m2 at 1.5 x the filtration flow rate

Pads sterilization

Direction of use: each AEB DFR sheet consists of:
- A rough side, representing the entrance of the filtered product.
- A smooth side, representing the exit of the filtered product.

Pressure difference: according to the standard operating mode, filtration must be halted when the maximum permissible pressure difference of 300 kPa (3 bar) is reached. To work under maximum safety conditions, a pressure difference of 150 kPa (1,5 bar) must not be exceeded during filtration for retention of microorganisms.

Disposal, handling and storage: thanks to their composition, depth filter sheets are biodegradable. However, the requirements of the local authority must be observed depending on the filtered product.

Carbon pads

AEB CARBON pads incorporate activated carbon within a cellulose matrix, providing superior adsorption efficiency compared to powdered carbon while eliminating dust and improving permeability. They are used for deodorization, decolorization, and water treatment applications.

Perlite filtration earths, pre-coat and body feed

FIBROXCEL 10

PRODUCT PROFILE | Pre-coat with 10% fibers for gross filtration.

PERMEABILITY | = 120 l (30 gallons)/m²/minute.

DOSAGE | 0.5-1 kg (1-2.2lb)/m² of filtering area for the formation of the pre-coat or in variable doses between 50 to 500 g/hl (4-40 lb/1,000 gallons) for the body feed filtration.

FIBROXCEL 30

PRODUCT PROFILE | Pre-coat with 30% fibers for polishing filtration.

PERMEABILITY | = 50 l (13 gallons)/m²/minute.

DOSAGE | Should be used in a variable dose between 0.8 and 1kg (1.7-2.2lb)/m² of filtering surface for building up the pre-coat, 20 and 80 g/hl (1.5-6 lb/1,000 gallons) for the body feed filtration.

FIBROXCEL VAC

PRODUCT PROFILE | Vacuum filters tend to have an extremely compact layer of earths that eventually breaks or plugs, FIBROXCEL VAC mixed at 10% with the DE used for the filtration guarantees a smooth cut of the top layer and, thanks to its softening action, delays plugging of the cake and prevents cracks. The drum cut is linear and micrometric, with a noticeable increase in the total filtration capacity, with the result of a more satisfactory yield.
The addition of FIBROXCEL VAC makes it possible to treat very quickly suspensions loaded with hazy matter, which would require a great work to discharge coats, with the assurance of an excellent result. FIBROXCEL VAC can also be used in conjunction with the body feed in pressure filters for particularly hazy musts and concentrates.

***FIBROXCEL** is a registered trademark of AEB.*

SILITE Mini Speed

PRODUCT PROFILE	A very fine perlite, with low flow-speed, used for tight filtrations, especially the polishing ones.
PERMEABILITY L/M²/MINUTE	68-77, specific weight when wet: 0,21-0,23.
APPLICATIONS	Final filtrations of wines, vinegars, dry spirits, beer, oils, juices, distillates.

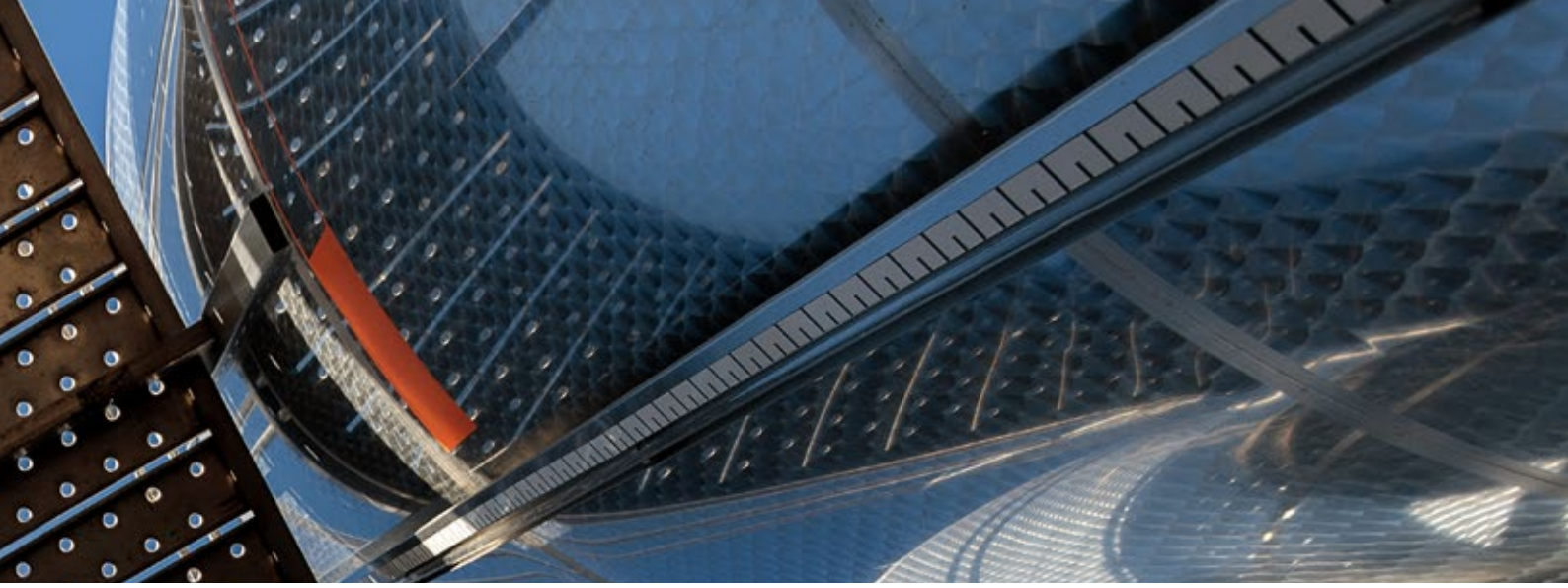
SILITE Normal Speed

PRODUCT PROFILE	Perlite with medium permeability and is recommended for all uncomplicated filtrations. It is used for normal filtrations.
PERMEABILITY L/M²/MINUTE	127-147, specific weight when wet: 0,20-0,22.
APPLICATIONS	Filtrations of wines, sweet spirits, distillates, fruit juices, syrups, beer, industrial drains, etc.

SILITE High Speed

PRODUCT PROFILE	The high permeability of this perlite makes it ideal for filtering very hazy liquids with a high content of suspended solids. It is classified as a perlite for coarse filtrations.
PERMEABILITY L/M²/MINUTE	200-240, specific weight when wet: 0,16-0,18.
APPLICATIONS	Coarse filtrations of musts, worts, cloudy wines, thick spirits or syrups.


09



Equipment

AEB
ENGINEERING

100% ITALIAN PRODUCTION

ASSISTANCE

OPTIMIZATION

QUALITY • *DESIGN*

CUSTOMIZATION

SUPPORT • SAFETY

PERFORMANCE

GLOBAL PRESENCE • EXPERIENCE

Equipment

Tailor-made technologies and solutions for wineries

AEB ENGINEERING is a leading designer and manufacturer of **technology for production**, **treatment and hygiene** in the wine sector. It is renowned for its unique approach focused on **customisation** and highly **qualified support**.
Together with **100% in-house production** and a comprehensive range, AEB ENGINEERING guarantee you the **highest quality and performance**.

Equipment for yeast rehydration & propagation

Correct yeast preparation is **one of the most critical yet underestimated steps in alcoholic fermentation**. Modern research consistently shows that fermentation reliability, aroma expression, and resistance to stress are strongly influenced not only by yeast strain selection, but by **rehydration quality**, **oxygen management**, **nutrient timing**, and the **physiological state of the inoculated biomass**.
Poorly rehydrated or inadequately acclimated yeast may survive inoculation but express reduced metabolic efficiency, longer lag phases, higher production of undesirable metabolites, and lower dominance over indigenous microflora. Conversely, yeast prepared under controlled aerobic conditions with progressive sugar and must acclimation shows higher membrane integrity, better sterol synthesis, faster implantation, and more predictable kinetics, even in difficult musts.
The following systems are designed to standardize and optimize these steps, eliminating operator variability and ensuring consistent yeast prevalence at inoculation.

REACTIVATEUR 60

Automatic yeast rehydration & acclimation for reliable fermentations

Function and technological role

REACTIVATEUR 60 is an automatic system designed to **standardize yeast rehydration and acclimation**, ensuring **rapid fermentation start** and **consistent dominance of selected yeasts**. Fermentation research clearly demonstrates that yeast prevalence is the primary determinant of fermentation success; strain selection alone is insufficient if inoculated cells fail to dominate indigenous flora.
To achieve prevalence, the inoculated yeast population must be at least 20× higher than the native microbial load, and cells must be metabolically active at the time of inoculation. REACTIVATEUR 60 ensures both conditions by controlling temperature, hydration kinetics, aeration, and gradual must addition.

How it works

The system automatically:
- adds the correct volume of water based on yeast quantity
- heats to optimal rehydration temperature
- alternates agitation, rest, and aeration phases improving biomass
- gradually acclimates yeast by adding must avoiding temperature shocks.

Key advantages

- Lower usage of dry yeast (about half).
- Shorter yeast lag phase.
- Highly regular alcoholic fermentations.
- Guaranteed yeast prevalence.
- Improved fermentation kinetics under non-ideal conditions.
- Restart of sluggish or stuck fermentations.
- Production of yeast-rich must for secondary fermentations (Charmat or traditional method).

Available models

Multiple configurations allow rehydration of:
- From 1 kg up to 50+ kg of dry yeast, depending on model.

REACTIVATEUR 60 RIF

Advanced Rehydration, Acclimation & Refermentation Management

PRODUCT PROFILE

REACTIVATEUR 60 RIF expands the capabilities of the standard REACTIVATEUR by integrating enhanced acclimation control and flexibility for use in must, wine, or partially fermented matrices. It is specifically designed for situations where yeast faces alcohol, low nutrients, or high osmotic stress, such as refermentations or difficult ferment restarts.
By carefully managing oxygen exposure, sugar availability, and temperature gradients, the RIF system preserves yeast vitality while avoiding premature fermentation during preparation.

HOW IT WORKS

In addition to standard rehydration, the RIF system:
- maintains aerobic conditions during reactivation
- adds sugar solutions (5–8%) to prevent metabolic interruption
- controls temperature differentials to ≤5 °C
- supports yeast multiplication without triggering ethanol production.

TECHNOLOGICAL BENEFITS

- Ensures yeast and bacterial prevalence in competitive environments.
- Improves success in refermentation with alcohol present.
- Maintains yeast at the highest multiplicative stage before inoculation.
- Produces highly active inocula for secondary fermentation.

OPERATING MODES

- Classic mode: ideal for musts.
- RIF mode: ideal for wine or partially fermented substrates (secondary fermentations or restarts).

IDEAL APPLICATIONS

- Restarting difficult fermentations.
- Sparkling wine refermentation.
- High-alcohol or nutrient-poor environments.
- Situations requiring maximum yeast dominance.
- Equipment for Yeast Rehydration & Propagation.

PROPAGATOR (BIOREACTOR X10 1.5)

Controlled yeast multiplication, physiological optimization & inoculum scaling

FUNCTION AND TECHNOLOGICAL ROLE

PROPAGATOR (BIOREACTOR X10 1.5) is an advanced system designed not only for yeast rehydration, but for controlled aerobic biomass multiplication under winery conditions. While dry yeast already contains a large number of viable cells, current fermentation research clearly shows that cell number alone does not guarantee fermentation performance. The physiological state of the yeast, membrane composition, sterol content, stress resistance and metabolic readiness are the determining factor for fermentation reliability, especially in high-sugar, high-alcohol or microbiologically competitive musts.

BIOREACTOR X10 1.5 allows wineries to start from a small quantity of selected dry yeast and obtain a large volume of highly active, physiologically optimized biomass, produced under controlled conditions that favor sterol synthesis, membrane reinforcement and balanced growth.

OPERATING PRINCIPLE AND PROCESS LOGIC

The system combines the proven rehydration protocol of the REACTIVATEUR with a feed-batch aerobic propagation phase. Yeast is first rehydrated under optimal temperature and agitation conditions, then progressively multiplied through controlled feeding of carbon and nutrients while maintaining aerobic conditions. This avoids fermentative metabolism and favors biomass growth rather than ethanol production.

TYPICAL OPERATING PARAMETERS

- Initial yeast load: typically, 1–5 kg of dry yeast.
- Propagation cycles: 8 or 24 hours.
- Multiplication factor: approximately 5× to 20×, depending on strain, cycle duration and feeding strategy.

CARBON, NUTRIENT AND TEMPERATURE MANAGEMENT

The winery connects the system to:

- a sugar source (sucrose or acidified concentrated must)
- a dedicated nutrient solution supplied for the system.

The PLC allows the operator to input the dilution ratios of sugar and nutrient solutions so the Bioreactor can automatically calculate and dose the correct volumes during each feeding cycle. Carbon is supplied progressively to avoid osmotic shock and to keep yeast in a respiratory growth phase.

Temperature is precisely controlled via internal heat-exchange flanges, supplied with chilled water or glycol, ensuring stable propagation conditions throughout the cycle.

MICROBIOLOGICAL SECURITY AND HYGIENE

Because the system actively multiplies biomass, microbiological control is critical. To minimize contamination risks:

- processing water is filtered through an ENOWATER system
- if concentrated must is used as a carbon source, acidification is mandatory to prevent growth of spoilage organisms
- the system is fully enclosed and designed for sanitary operation.

BIOREACTOR X10 1.5 includes an automatic CIP system, completing a full cleaning cycle in approximately 10 minutes. This minimizes downtime while ensuring repeatable hygienic conditions between cycles.

SCALING IMPACT AND PRACTICAL BENEFIT

The system allows dramatic scaling of inoculum size. Starting from 5 kg of dry yeast an 8-hour cycle can yield the equivalent of ~40 kg of active yeast.

This represents a major advantage for wineries seeking:

- reduced yeast procurement costs
- guaranteed strain dominance
- high fermentation security across large volumes
- consistent yeast physiology across multiple tanks.

IDEAL APPLICATIONS

- Wineries requiring reliable strain dominance.
- Difficult fermentations (high sugar, high alcohol, low nitrogen).
- Sequential tank inoculations with identical yeast physiology.
- Restarting or reinforcing fermentations under stress.

BIOREACTOR X10 1.5 translates modern yeast physiology and propagation science into a scalable, automated cellar tool, bridging laboratory-level control with real-world winery operation.

Gas management in modern winemaking

Dissolved gases play a **critical but often underestimated role in wine stability, sensory expression and shelf life**. Oxygen and carbon dioxide, in particular, influence redox balance, microbial activity, colloidal behavior and aromatic evolution from fermentation through bottling. Traditionally, chemical tools such as sulfur dioxide and ascorbic acid have been used to manage oxidative risk; however, contemporary winemaking increasingly integrates physical gas-management technologies to control dissolved gases directly, reducing reliance on additives while improving precision and repeatability.
By actively removing or regulating dissolved oxygen and carbon dioxide, gas-management systems help:

- **slow oxidative degradation of aroma and color**
- **preserve freshness** during processing and bottling
- **stabilize wines** destined for long distribution chains
- **support low-SO_2** or reduced-intervention programs.

From a physical standpoint, gas control relies on the same principles governing gas solubility and diffusion: partial pressure gradients, molecular mobility and equilibrium between phases. The way these principles are applied, however, can differ substantially depending on the technology used. Some systems act through direct gas–liquid contact, promoting rapid exchange but with limited selectivity; others rely on membrane-based diffusion, enabling controlled migration of specific small molecules without disturbing the wine matrix.

The following sections describe two complementary approaches to gas management:
a selective membrane system designed for precise oxygen and CO_2 regulation with minimal sensory impact, and a stripping-based system that achieves rapid bulk gas removal through forced gas exchange.

Understanding the physical mechanisms behind each approach allows winemakers to select the most appropriate technology based on wine style, quality objectives, operational scale and economic considerations.

ISIOX

Selective regulation of dissolved gases by membrane diffusion

POWERED BY EXPERTI

FUNCTION AND TECHNOLOGICAL ROLE

ISIOX is an advanced gas-management system developed within the FREEWINE® research program to control dissolved gases in wine through selective molecular diffusion rather than mechanical stripping. The technology is based on the physical behavior of gases in solution and their migration across a semi-permeable membrane according to partial-pressure gradients, as described by Henry's law and Fick's laws of diffusion.

PHYSICAL PRINCIPLE OF OPERATION

In wine, dissolved gases such as oxygen (O_2), carbon dioxide (CO_2), hydrogen sulfide (H_2S) and free acetaldehyde exist in equilibrium between the liquid phase and the surrounding atmosphere. Their solubility and reactivity depend on temperature, pressure and molecular size. ISIOX exploits these principles by circulating wine along one side of a selective membrane while a technical inert gas (typically nitrogen, CO_2 or argon) flows on the opposite side.

Because the partial pressure of the target gas is deliberately kept lower on the gas side of the membrane, small molecules naturally migrate from the wine toward the gas phase until a new equilibrium is reached. This migration occurs without bubbling, turbulence or direct gas–liquid contact, making the process highly controlled and repeatable.

MOLECULAR SELECTIVITY

The effectiveness of ISIOX is rooted in the molecular size and diffusivity of the compounds involved. Small, low-molecular-weight gases diffuse readily across the membrane:

- Oxygen (O_2) ≈ 32 Da
- Carbon dioxide (CO_2) ≈ 44 Da
- Hydrogen sulfide (H_2S) ≈ 34 Da
- Free acetaldehyde ≈ 44 Da

By contrast, aromatic compounds, esters, thiols, higher alcohols and phenolics have much larger molecular sizes and do not migrate across the membrane. As a result, ISIOX can reduce dissolved oxygen by up to 95–97%, adjust CO_2 concentration over a wide range, and eliminate reductive sulfur compounds without stripping aroma or affecting wine structure.

OPERATIONAL FLEXIBILITY IN THE CELLAR

ISIOX is designed as a multi-functional cellar tool, not a single-purpose oxygen remover. Depending on configuration and process gas, it can be used to:

- deoxygenate wine before or after racking, filtration and bottling
- reduce hydrogen sulfide and light reductive notes below sensory threshold
- adjust dissolved CO_2 downward for textural refinement or upward for freshness and protection
- lower free acetaldehyde, indirectly stabilizing color and aroma
- protect wines during cold stabilization, blending and packaging.

Because the system operates in closed circuit and under gentle hydraulic conditions, it integrates seamlessly into existing cellar lines without increasing oxygen pickup or shear stress.

STRATEGIC ROLE IN MODERN WINEMAKING

ISIOX represents a shift from corrective chemistry to physical prevention. By managing dissolved gases directly, winemakers can significantly reduce dependence on sulfur dioxide, ascorbic acid and other redox-active additives, supporting low-input, low-SO_2 and long-shelf-life wine programs. Its selectivity makes it particularly valuable for aromatic whites, reductive-style wines, premium reds, and wines destined for long transport or extended bottle aging.

In essence, ISIOX applies fundamental gas-law principles to wine, transforming gas management from an uncontrolled side effect into a precise, measurable and sensory-driven enological tool.

STRIPPING CONTROL SYSTEM

Bulk gas removal by forced phase transfer

The STRIPPING CONTROL SYSTEM is a conventional gas-management technology based on forced mass transfer between wine and an injected gas stream. Unlike selective membrane systems, stripping operates by introducing a large volume of technical gas (typically nitrogen or CO_2) directly into the wine, creating intense gas–liquid contact that physically removes dissolved gases according to volatility and vapor–liquid equilibrium.

Physical mechanism of stripping

In stripping, wine is exposed to rising gas bubbles or dispersed gas streams. As the gas phase passes through the liquid, dissolved gases migrate into the bubbles and are evacuated from the system. This mechanism is driven by:

- high interfacial surface area between wine and gas
- turbulence and agitation, which accelerate mass transfer
- partial-pressure gradients.

Typical cellar applications

Stripping systems are generally used for:

- emergency oxygen reduction
- high-CO_2 degassing prior to bottling
- corrective interventions on compromised wines
- large-volume, cost-sensitive operations where fine aroma retention is less critical.

Comparison with selective membrane systems (ISIOX)

The fundamental difference between stripping and ISIOX lies in how molecular movement is induced

STRIPPING	ISIOX
Direct gas–liquid contact	No gas–liquid contact
Bulk, non-selective removal	Selective diffusion by molecular size
High gas consumption	Low gas consumption
Aroma loss possible	Aromas preserved
Lower capital cost	Higher capital cost
Lower precision	High precision & repeatability

This difference explains the significant cost gap between the two technologies. Stripping systems are mechanically simpler and less expensive upfront, but they trade precision for force. ISIOX, by contrast, requires advanced membranes, controlled gas circuits and tighter engineering tolerances, resulting in higher capital investment but far greater control, selectivity and wine quality preservation.

Strategic positioning

In modern cellars, stripping systems remain a useful corrective tool, particularly where speed and cost efficiency outweigh sensory refinement. However, as wine programs increasingly prioritize shelf life, aroma integrity and reduced chemical inputs, stripping is best viewed as a coarse adjustment tool, while membrane-based systems represent a fine-tuning, quality-driven solution.

STABYMATIC

Cation-exchange tartrate stabilization and calcium reduction with controlled pH drop

WHY TARTRATE STABILIZATION MATTERS (AND WHY PH SHIFTS)

Tartrate instability is driven by the natural equilibrium between tartaric acid, potassium (K^+) and calcium (Ca^{2+}) in wine. When a wine is cooled, concentrated, or simply stored over time, it can exceed the solubility limit of potassium bitartrate (KHT) and/or calcium tartrate, leading to crystal precipitation in tank or bottle. Because K^+ and Ca^{2+} are key counter-ions in these equilibria, reducing their concentration shifts the system back toward solubility and increases tartrate stability.

STABYMATIC achieves this through cation exchange: it selectively removes electropositive ions (notably K^+ and Ca^{2+}), which reduces conductivity and results in a pH decrease.

This approach stabilizes wine without cold-holding and without adding "tartrate inhibitors" like CMC or KPA because it changes the ionic balance that causes precipitation in the first place.

HOW ION EXCHANGE WORKS IN STABYMATIC (PHYSICAL/CHEMICAL PRINCIPLE)

STABYMATIC uses pH-Stab 2.0, a strong-acid cation exchange resin (sulfonic functional groups on a styrene/divinylbenzene polymer matrix).

The resin is maintained in the H^+ form. As wine passes through the column, cations in the wine (especially K^+ and Ca^{2+}) are retained by the resin and exchanged for H^+.

In practical terms:

- cations are removed → conductivity drops (fewer charged species in solution)
- H^+ is released into the wine → pH drops (the "acidifying" effect is intrinsic to the exchange mechanism)
- the system is engineered to avoid altering organoleptic quality, using enological flow management and dedicated pumps/lines.

A useful way to visualize the "driving force" is that the resin is effectively a controlled reservoir of exchangeable H^+ sites. As the wine's cations load the resin, exchange capacity is progressively consumed. In the automatic system, when a set target is reached (pH/conductivity setpoint), the equipment switches to regeneration.

RESIN REGENERATION (ACID+, ALCA–) AND WHY SULFURIC ACID IS USED

Once exchange sites are saturated, the resin must be returned to its acidic (H^+) form. STABYMATIC performs regeneration using Acid+, an activator based on 17% sulfuric acid, designed to restore the resin to the acid form while preserving polymer characteristics.

OPERATING CONCEPT AND CONTINUOUS WORK (TWO COLUMNS)

STABYMATIC 500, 1000 and 2000 are designed with separate circuits for wine and regenerants and are set up so they can work continuously: one column can be regenerating while the other is exchanging. This is a major practical advantage in harvest and bottling windows, because stabilization can proceed without long downtime between exchange and regeneration cycles.

AUTOMATIC VS SEMI-AUTOMATIC VS MANUAL: WHAT CHANGES FOR THE WINERY

STABYMATIC can operate in three modes:

- **Automatic**: the unit manages both exchange and regeneration, alternating cycles until it reaches the set target (setpoint).
- **Semi-automatic**: the operator selects the desired function; the machine executes that function (useful for wineries that want more control over sequencing).
- **Manual**: the operator can control individual utilities via touchscreen selection (for troubleshooting, special cycles, or very specific operational constraints).

The semi-automatic functional menu includes steps such as filling/recirculating the accumulator, rinsing, draining with nitrogen, and rinsing wine lines, essentially letting the cellar team “call” the required step when it fits their workflow.

IDEAL CONDITIONS

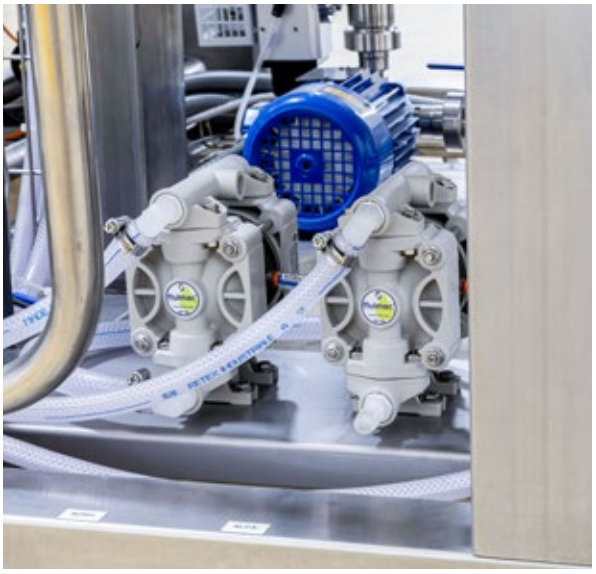
- Stable, clarified wine is generally preferred for predictable exchange kinetics and to keep the system clean, but STABYMATIC is engineered to maintain complete cation exchange even at elevated turbidity, thanks to the column geometry and diffuser design.
- Use the dedicated wash/regeneration programs (including alkaline wash when needed) to maintain performance over time.

AUTOMATIC MODELS

- **STABYMATIC 500**: up to 30 hL/h (≈ 793 gal/h)
- **STABYMATIC 500 Auto Single Column** *(batch / discontinuous)*: up to 60 hL/h (≈ 1,585 gal/h)
- **STABYMATIC 1000**: up to 60 hL/h (≈ 1,585 gal/h)
- **STABYMATIC 1000** Auto GF: up to 60 hL/h (≈ 1,585 gal/h)
- **STABYMATIC 2000**: up to 120 hL/h (≈ 3,170 gal/h)

ECO SEMI-AUTOMATIC/MANUAL MODELS

- **30 ECO**: up to 3 hL/h (≈ 79 gal/h)
- **50+50 ECO C**: up to 6 hL/h (≈ 158 gal/h)
- **100 ECO E**: up to 13 hL/h (≈ 343 gal/h)
- **200 ECO C**: up to 25 hL/h (≈ 661 gal/h)
- **500 ECO C**: up to 60 hL/h (≈ 1,585 gal/h)



E-FLOT

Batch flotation system

DESIGN AND FUNCTION

The E-FLOT system is a batch flotation unit designed specifically for the clarification of white and rosé musts prior to fermentation. From a mechanical standpoint, the system consists of a single or double screening unit to remove coarse solids from the must, a dedicated saturation tank equipped with controlled gas and fining-agent injection, and an integrated pump for circulation and transfer. Unlike continuous flotation systems, E-FLOT operates on batches, allowing the winemaker to adapt enzyme dosage, fining strategy and clarification targets to each individual lot of must.

In operation, gas, typically nitrogen, is introduced in a controlled manner to generate microbubbles with a high surface-area-to-volume ratio. These bubbles are optimized to attach to flocs formed by protein fining agents such as GELSOL (liquid gelatin) or VE-GEL / VE-GEL Liquid (vegetable protein alternatives). Once attached, the buoyancy of the bubble–floc complex causes the solids to rise rapidly and form a compact flotation cap, while clarified must remains below and can be drained or racked.

FLOW CAPACITY AND MODEL RANGE

The E-FLOT system is available in multiple sizes to accommodate different winery scales, from small batch processing to high-throughput harvest operations. Each model is defined by its maximum processing capacity, expressed below in both hectoliters per hour and US gallons per hour.

- **E-FLOT 10**: ~120 hL/h (≈ 3,170 gal/h)
- **E-FLOT 25**: ~250 hL/h (≈ 6,600 gal/h)
- **E-FLOT 50**: ~500 hL/h (≈ 13,200 gal/h)
- **E-FLOT 80**: ~800 hL/h (≈ 21,133 gal/h)
- **E-FLOT 130**: ~1,300 hL/h (≈ 34,300 gal/h)

Model selection depends on average press load and cycle time, desired clarification window, winery logistics (tank availability and press rhythm), and peak harvest throughput requirements.

RED FAST

Rapid color extraction and cap management system

PRINCIPLE OF OPERATION

RED FAST is a compact and highly efficient system designed to accelerate color extraction during red wine vinification while preserving phenolic balance. The system operates by injecting air or CO_2 into the must or wine, generating controlled bubbles that immerse the grape skins beneath the liquid surface. This promotes rapid diffusion of anthocyanins and desirable phenolics without the mechanical stress associated with aggressive pump-overs or délestage.
Unlike mechanical cap management systems, RED FAST relies on gas-driven turbulence, which enhances extraction kinetics while minimizing the release of harsh seed-derived or green tannins. The result is faster color stabilization, improved chromatic intensity, and cleaner phenolic profiles.

PHYSICAL MECHANISM AND ENOLOGICAL IMPACT

The injected gas forms a single, large bubble at the outlet of a specially designed nozzle positioned approximately 30–50 cm below the cap. This bubble lifts and submerges the pomace uniformly, increasing skin–liquid contact while avoiding shear forces that could damage skins or extract vegetal components.
The system can operate in two distinct modes:

- **inert mode (CO_2)**: when the suction pipe is placed inside the tank during active alcoholic fermentation, CO_2 is used, maintaining an oxygen-free environment and preserving reductive conditions
- **air mode**: when fermentation has not yet started or when the suction pipe is positioned outside the tank, air is used to stimulate yeast biomass production and color stabilization.

EQUIPMENT DESIGN AND PRACTICAL USE

RED FAST consists of:

- two stainless steel pipes (one for intake, one for injection)
- a dedicated gas injection nozzle
- and an integrated control unit.

The system is plug-and-play: it requires no permanent installation, no tank modification, and can be moved easily between tanks. Once connected to power and gas, it is immediately operational.
RED FAST is designed for tanks up to 300 hL (≈8,000 gallons).

ADVANTAGES

- Accelerates color extraction in hours rather than days.
- Limits extraction of green or bitter tannins.
- Preserves skin integrity and aromatic freshness.
- No installation, minimal labor, high repeatability.

RED FAST integrates seamlessly into modern red wine fermentation programs focused on precision extraction and phenolic balance.

DOSAPROP

Proportional in-line dosing system

CONCEPT AND ENOLOGICAL RATIONALE

DOSAPROP is an in-line proportional dosing system designed to add liquid oenological products with maximum precision and homogeneity. Unlike manual or batch dosing, DOSAPROP adjusts product addition in real time, proportionally to the flow of must or wine passing through the line.
This approach ensures:

- exact dosage regardless of flow variation
- perfect homogenization
- and repeatable results across different operations (racking, filtration, transfer, bottling).

DOSAPROP is particularly valuable when dosing reactive products such as tannins, gum Arabic, CMC, SO_2, fining aids, and stabilizers, where uneven distribution can lead to instability or sensory deviation.

HOW THE SYSTEM WORKS

At the core of DOSAPROP is a flow sensor installed in the transfer line. As wine, must, or crushed grapes pass through, the sensor continuously measures the actual flow rate and sends a signal to the PLC control unit. The PLC then commands one or more piston dosing pumps to inject the exact proportional quantity of product required.

The physical dosing mechanism is based on:

- AISI 316 stainless steel piston pumps, ensuring continuous (non-pulsed) flow
- inverter-controlled motor speed for micro-adjustment of dosage
- calibrated non-return valves preventing backflow or contamination of the product container.

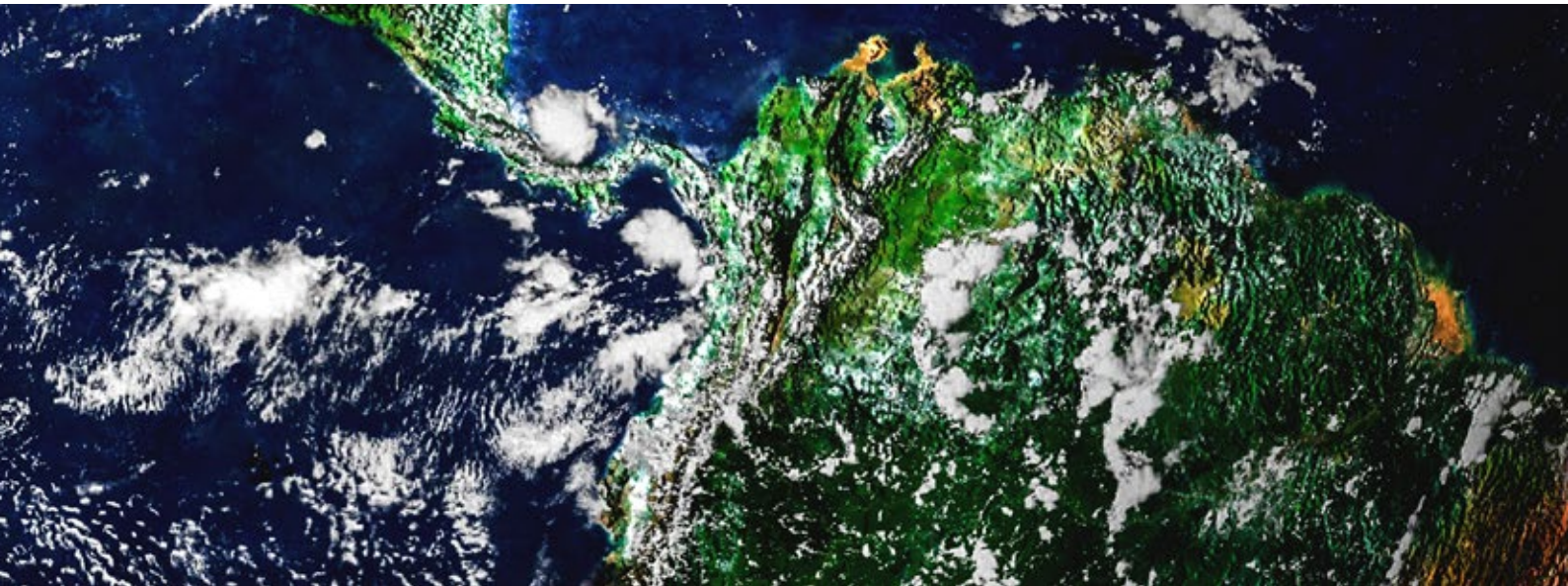
This architecture guarantees dosing accuracy even under variable pressure or flow conditions.

DOSAPROP RANGE AND CONFIGURATIONS

The DOSAPROP family includes three main configurations:

- **DOSAPROP**
  Designed for winery lines with flow rates from 6 to 60 hL/h (160 – 1,600 gallons/hr). Available also in a dual-pump version to dose two different products simultaneously
- **DOSAPROP HI-FLOW**
  Engineered for high-capacity operations, managing flows from 100 to 1,200 hL/h (2,600 - 36,000 gallons/hr), suitable for must, wine, or crushed grapes. Equipped with DN80 or DN100 magnetic flow meters for precise readings at high throughput. Up to three products dosing

Glossary, Certification & Contacts



Organic Importer Certification

CCOF Certification Services, LLC

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www.ccof.org
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Santa Cruz, CA 95060, United States of America
certifies that

AEB BIOCHEMICAL USA

209-625-8139 - mbertaccini@aeb-group.com
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PO BOX 16339 Fresno, CA 93755, United States of America	111 N Cluff Avenue Lodi, CA 95240, United States of America

is certified to the USDA organic regulations, 7 CFR Part 205, for the categories of Handling

Once certified, a production or handling operation's organic certification continues in effect until surrendered, suspended, or revoked. Status of this certification and specific certified organic products covered may be verified at https://organic.ams.usda.gov/Integrity/CP/OPP?nopid=5561008533

ORGANIC CERTIFICATE

Certifier Client ID:	pr3463
Certificate Number(s):	5561008533
NOP Operation ID:	5561008533
Effective Date:	7/31/2024
Anniversary Date:	01/01/2027
Issue Date:	1/7/2026

In accordance with the USDA National Organic Program and the Strengthening Organic Enforcement (SOE) regulation (7 CFR Part 205), importers of organic products into the United States are required to be certified as organic handlers. We are fully certified as an organic handler by a USDA-accredited certifying body, authorizing us to import, handle, and distribute organic products in compliance with current U.S. organic regulations. This certification ensures full traceability, regulatory compliance, and integrity of organic products throughout the supply chain.

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