SPARKLING WINE
HANDBOOK

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Inspiring innovation.

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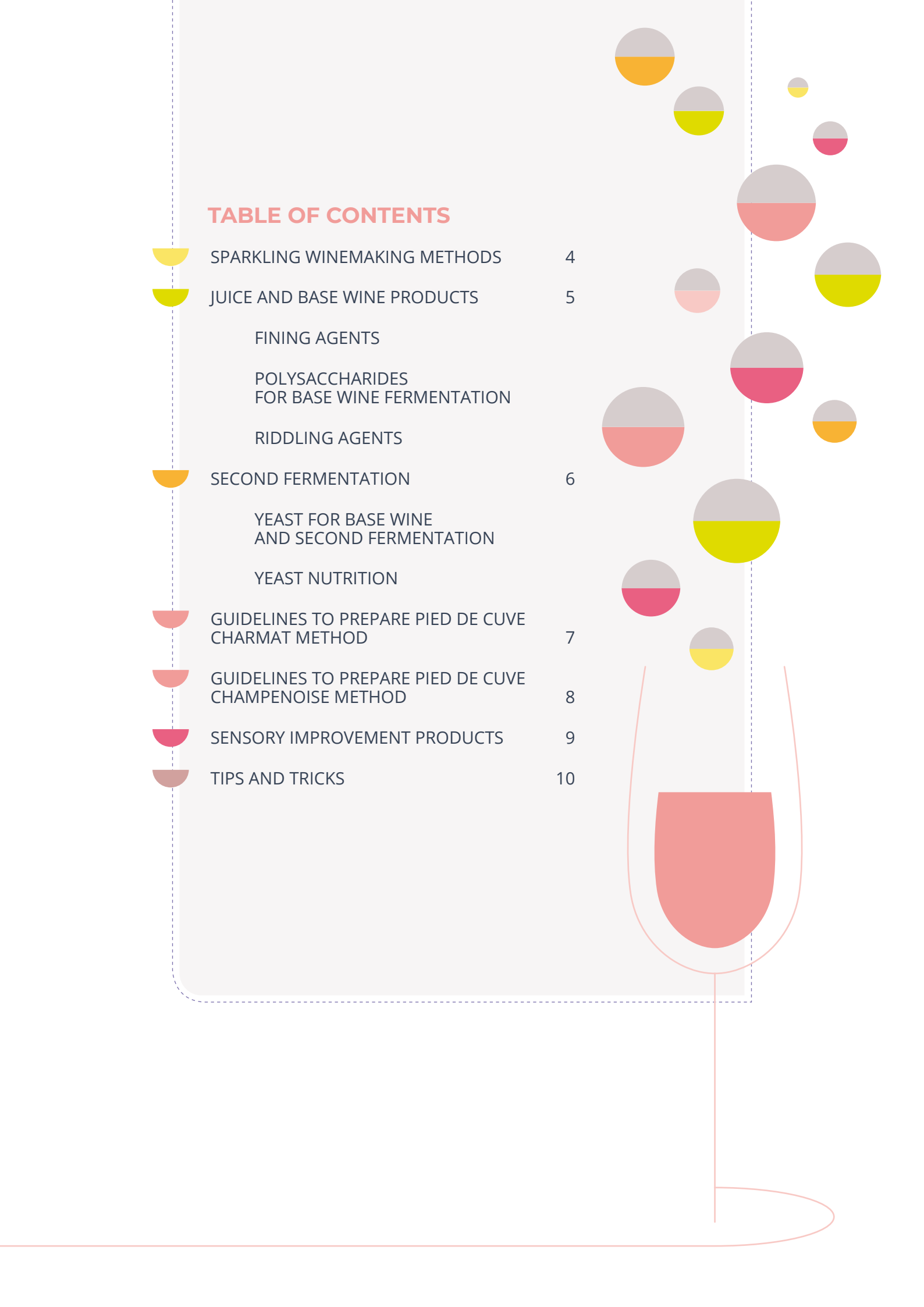
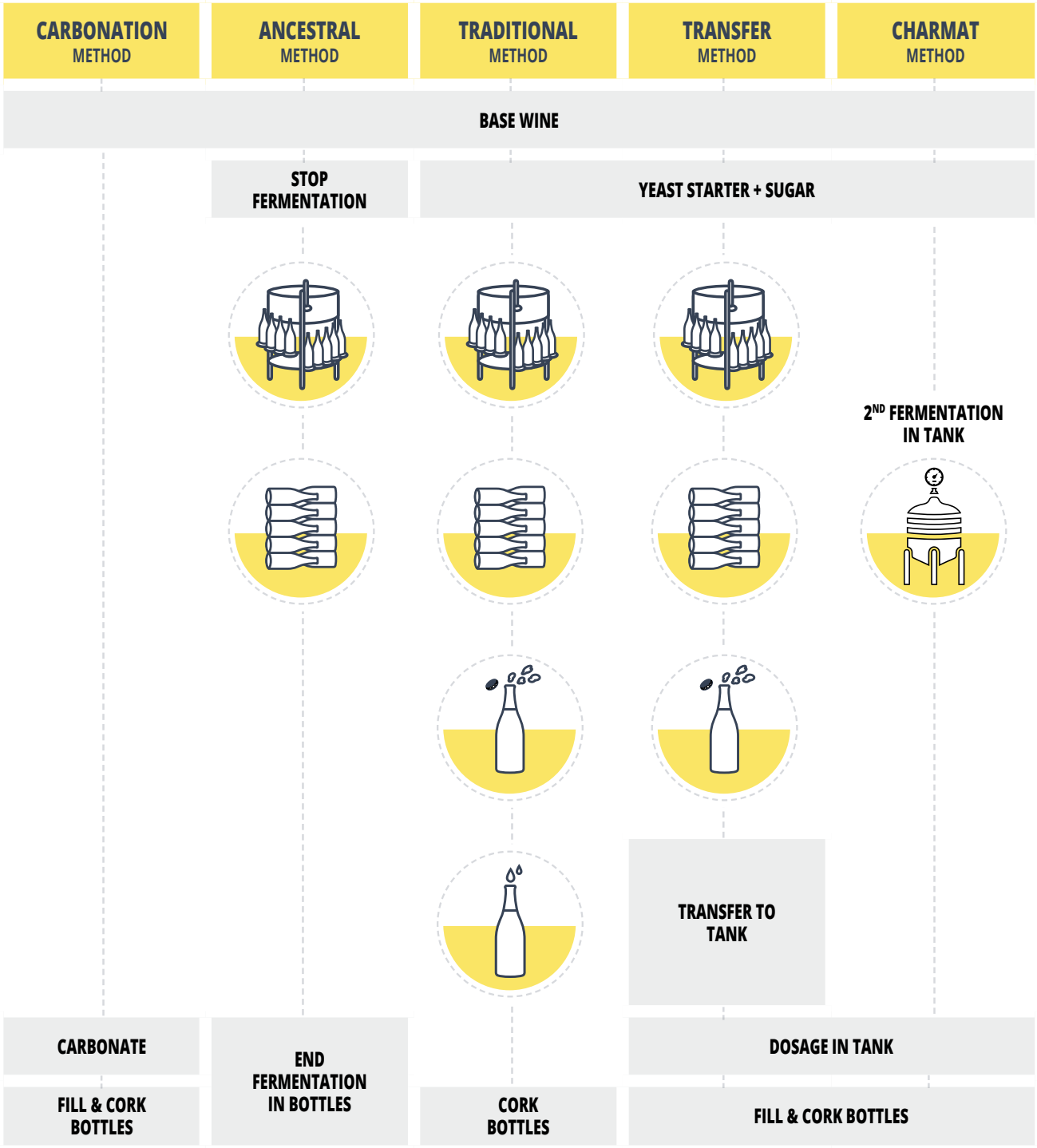


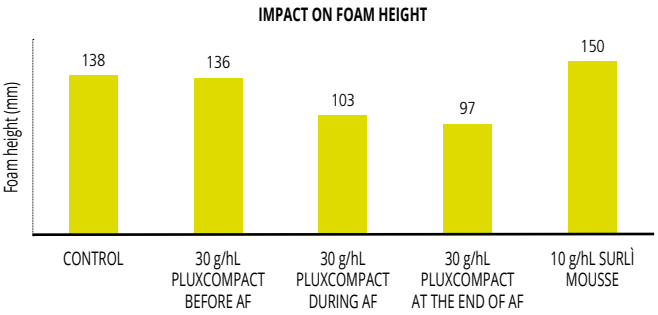
SPARKLING WINEMAKING METHODS

There are several different methods for sparkling wine production.
Enartis can assist you in maximizing wine quality regardless of the method you select.



FINING AGENTS

Fining agents can be used for many purposes in winemaking including clarification, filterability improvement, prevention of haze and sediment formation, improvement of organoleptic profile and wine color, and removal of undesirable elements from wine.



The Fining Process

Each fining agent has specific properties and reacts with various wine constituents depending on its origin, density of charge, molecular weight and chemical properties. Product preparation, temperature, pH, metal content of wine and previous fining treatments are factors that can influence the effectiveness of fining.

Fining in Sparkling Wines

It is important to consider quality variations from press juices to choose and adapt the winemaking process. Removal of undesired elements present in juice (solids, polyphenols, color, proteins, lipids, etc.) before starting fermentation is fundamental. Enartis has developed fining agents specific for sparkling wine production that remove unwanted elements while respecting foaming properties.

PROCLAIR BC	Specific for white and rosé juice clarification. After pressing or during the first fermentation, Proclair BC eliminates oxidases and polyphenols responsible for oxidation. In addition to produce fresher and with longer shelf-life base wines, it improves protein stability.
CLAIRPERLAGE UNO	A blend of selected bentonites and plant proteins, Clairperlage Uno is suitable for the protein stabilization of base wines while respecting their foaming properties. It assures proper fining of young base wines, protein stabilization and it eliminates components that have a negative effect on foam.
CLAIRPERLAGE DUE	A blend of PVPP, plant protein and silica designed to freshen base wines intended for second fermentation. Clairperlage Due eliminates polyphenols responsible of oxidation, bitterness and excessive color. Efficient and simple to use, it can be used on base wine or directly in the tank during second fermentation.
FINECOLL	Granular isinglass which is soluble in cold water. It is useful for the clarification of all wines to reduce bitterness as well as oxidative and herbaceous characteristics without adversely affecting the structure of wine. Moreover, because it is scarcely affected by colloids, Finecoll improves brilliance and filterability of wines which are difficult to filter, particularly those derived from grapes which have been affected by *Botrytis* or those which have been subjected to strong mechanical treatment.
ENOBLACK PERLAGE	Compact pellet form decolorizing carbon, Enoblack Perlage is for must and wine discoloration. The pellet form makes it easy to use and rehydrate without dust.
PLUXCOMPACT	Sodium-calcium bentonite that combines excellent fining and protein removal properties with a limited volume of lees. In red wine it is recommended to eliminate unstable color compounds and, together with Goldenclar Instant, for fining before cross-flow filtration.
PHARMABENT	Bentonite of pharmaceutical quality. Due to its large surface, it is particularly effective in removing unstable proteins of lower molecular weight and unstable color. This helps reduce the dosage and minimize the impact on wine aroma and flavor.
PLANTIS AF-Q	Preparation made of pea protein and activated chitosan. It assures a nice clarification while forming small and compact lees, especially when used in flotation. At the same time, it improves juice and wine resistance to oxidation by removing pro-oxidant metals and low molecular weight polyphenols.
PLANTIS PQ	Allergen-free, vegan-friendly fining agent made of potato proteins and chitosan. It is effective in improving wine clarification, filterability, aromatic cleanliness and in removing oxidizable and oxidizable compounds. In red wine, it reduces the perception of astringency and dryness while respecting balance and structure.

POLYSACCHARIDES FOR BASE WINE FERMENTATION

Yeast mannoproteins in sparkling wines are used to amplify natural lees effects. Yeast autolysis and natural release of mannoproteins in wine is a very slow process. EnartisPro Perlage quickly increases the amount of mannoproteins released in wine and improves balance, roundness, volume, foaming capacity and antioxidant capacity.

ENARTISPRO PERLAGE	Inactivated yeast rich in readily available mannoproteins and amino acids with antioxidant effects. EnartisPro Perlage is suitable for the production of base wines that are fresh, round and balanced. When used in must, it ensures that aromas and color have antioxidant protection and that base wines can be stored for several months before second fermentation.

RIDDLING AGENTS

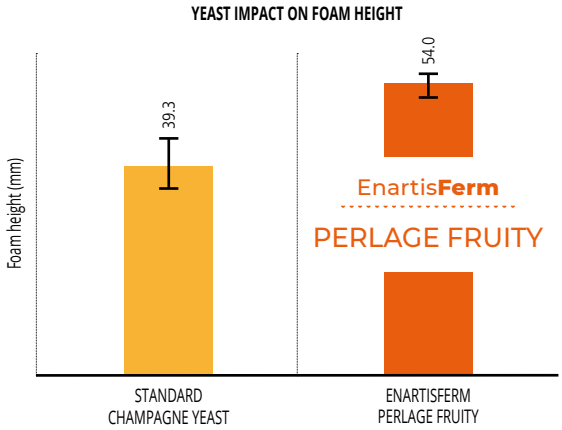
CLAIRBOUTEILLE P	Riddling agent containing selected bentonites. Clairbouteille P was developed to ease fining and to give compact and little sediment, both with automatic and manual riddling.
ENARTISTAN CLAIRBOUTEILLE	Blend of gallic and ellagic tannins. When used together with Clairbouteille P, it helps clarification in bottle and the formation of compact lees.

YEAST FOR BASE WINE AND SECOND FERMENTATION

Key words for alcoholic fermentation in sparkling winemaking are "complete" and "clean." Base wine must have good fermentation capacity, no residual toxins from the first fermentation, low free SO_2 (<10 ppm), low VA, low total SO_2, low residual CO_2 and low alcohol (<11%).
Specific, resistant yeast should be used for the *prise de mousse*. At this stage, choice of yeast will define the wine's "personality." Our sparkling-specific yeasts meet the criteria required to produce high-quality sparkling wines of any style.

Yeast Impact on Foam Properties

Yeast have a strong impact on wine composition, especially the amount of mannoproteins released into wine, thus impacting the foaming properties of sparkling wine.



EnartisFERM PERLAGE during "prise de mousse" improves the foaming capacity of wine.

Product	Recommendations	Wine Style
ENARTISFERM PERLAGE D.O.C.G	Base wine; *prise de mousse*; Charmat method; white, rosé and red sparkling wine	Clean, elegant, delicate white fruit aromas
ENARTISFERM PERLAGE FRUITY	Base wine; *prise de mousse*; Charmat method; aromatic sparkling wines; white, rosé and red sparkling base wines	"Modern Style," aromatic, intense fresh fruit
ENARTISFERM PERLAGE	Base wine; *prise de mousse*; traditional method; Charmat method; white and rosé wines; high mannoproteins; lees ageing	Elegant, delicate, clean, traditional style, round

YEAST NUTRITION

Understanding the nutritional requirements of yeast is fundamental for successful fermentations and preventing stuck fermentations. Managing nutrient requirements allows for regular and complete fermentations, as well as enhancing sensory qualities and minimizing sulfur compound production, such as H_2S. Enartis recommends providing amino acids and micro-nutrients during the *pied de cuve* preparation to build strong and resistant yeast cells and inorganic nitrogen with survival factors at *tirage* to ensure completion of fermentation without off-flavor development.

Enartis Nutrients for *Pied de Cuve* Preparation

During growth phase, yeast need amino acids, vitamins and minerals to build biomass and "healthy" cells, resistant to stress. Given that yeast assimilation of amino acids is inhibited by the presence of ethanol and high concentration of ammonium ions, the optimum time to add organic nitrogen is during *pied de cuve* preparation. Enartis has developed yeast nutrients for *pied de cuve* preparation that shorten lag phase, prevent H_2S and acetic acid formation, and increase production of polysaccharides.

Enartis Nutrients	Composition and Recommendations
NUTRIFERM PDC	Specific nutrient for the *pied de cuve* preparation. Yeast derived Nutriferm PDC stimulates yeast growth and provides them with the necessary elements to survive and ferment in difficult conditions. It creates the conditions needed for a complete and regular fermentation while limiting the production of sulfur compounds and volatile acidity.
NUTRIFERM PDC AROM	100% yeast derived nutrient for *pied de cuve* preparation. Nutriferm PDC Arom supplies yeast with indispensable amino acids for the synthesis and revelation of aromatic compounds. It is recommended for the production of fresh and fruity sparkling wines.

Enartis Nutrients for Second Fermentation

As soon as alcohol is present, yeast become stressed, their activity reduced and their nitrogen assimilation limited. To complete fermentation and increase their resistance to alcohol, yeast need survival factors, oxygen, detoxifying agents and ammonium ions.

Enartis Nutrients	Composition and Recommendations
NUTRIFERM GRADUAL RELEASE	This blend of DAP and tannin is contained in a special bag that, when introduced into a pressure tank, gradually releases its content during alcoholic fermentation. Nutriferm Gradual Release avoids the need for addition of nutrient after the closure of the pressure tank, guarantees a correct yeast nutrition and aromatic cleanliness.
NUTRIFERM TIRAGE	Complex nutrient, Nutriferm Tirage supplies yeast with essential organic and inorganic nitrogen as well as survival factors needed for second fermentation. It ensures a complete and regular fermentation in both traditional and Charmat methods.
NUTRIFERM REVELAROM	Autolyzed yeast rich in survival factors, copper salts and diammonium phosphate. Nutriferm Revelarom assures a complete fermentation even in difficult conditions and limits the appearance of light sulfur compounds.

GUIDELINES TO PREPARE *PIED DE CUVE*
CHARMAT METHOD

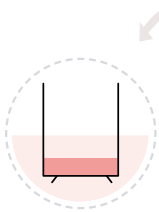
5% OF PDC FOR 100HL OF BASE WINE CHARMAT METHOD

20-30 MINS

STEP 1

Yeast Preparation

- Rehydrate 2 kg of EnartisFerm Perlage Fruity in 20 L of chlorine-free water at 35-40°C (95-104°F).
- Stir to avoid clumps formation.
- Wait 20-30 minutes then stir again.

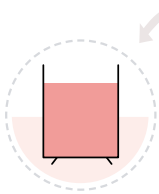


6 HRS

STEP 2

Yeast Acclimatization

- Add 2 kg of Enartis PDC Arom to step 1.
- Stir gently to avoid clumps formation.
- Add 100 L of base wine and 70 L of chlorine-free water (avoid thermal shock).
- Add 20 kg of sugar
- Always check density ~ 1030 g/L.
- Proceed with aeration (oxygen sparging or pump-over).
- Keep temperature around 20°C (68°F).
- Wait 6 hours until density drops to 1010 g/L.



6 HRS

STEP 3

Yeast Population Build-up

- Add 170 L of base wine and 120 L of chlorine-free water to step 2 (avoid thermal shock).
- Add 20 kg of sugar (density increases up to 1025-1030 g/L).
- Keep at 22°C (72°F) for 6 hours and provide air.
- When density drops to 1000 g/L inoculate to the total volume of base wine.

STEP 4

Addition to Base Wine

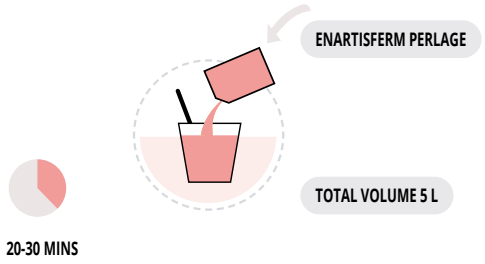
- 1 bag Nutriferm Gradual Release.
- Sugar 4 g/L for each bar of pressure desired.
- 1 g/hL EnartisTan CIT to increase freshness or
  1 g/hL EnartisTan FF to increase structure.
- Check that yeast inoculation rate must be ~ 6-8 x 10^6 cells/mL.

In Summary: What do you need?

EnartisFerm Perlage Fruity	2 kg
Nutriferm PDC Arom	2 kg
Sugar	30 kg + 4 g/L each bar of pressure
EnartisTan CIT or FF	1 g/hL
Nutriferm Gradual Release	1 bag

GUIDELINES TO PREPARE *PIED DE CUVE*
TRADITIONAL METHOD

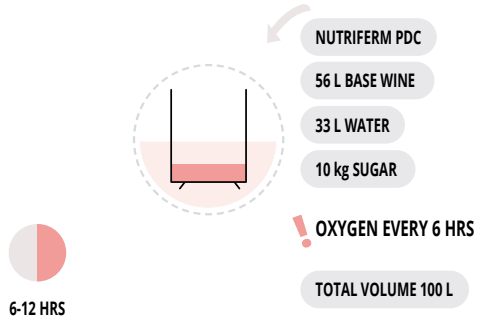
3% OF PDC FOR 100HL OF BASE WINE TRADITIONAL METHOD



STEP 1

Yeast Preparation

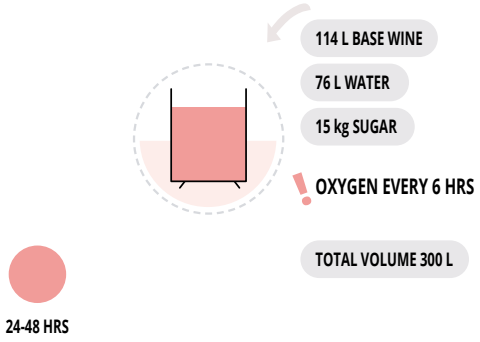
- Rehydrate 500 g of EnartisFerm Perlage in 5 L of chlorine-free water at 35-40°C (95-104°F).
- Stir to avoid clumps formation.
- Wait 20-30 minutes then stir again.



STEP 2

Yeast Population Acclimatization
Keep at 20°C (68°F)

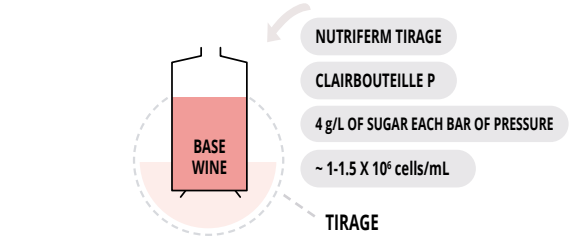
- Add 500 g of Nutriferm PDC to step 1. Stir gently to avoid clumps formation.
- Add 56 L of base wine and 33 L of chlorine-free water (avoid thermal shock).
- Add 10 kg of sugar.
- Check density ~ 1035-1040 g/L.
- Proceed with aeration (oxygen sparging or pump-over every 6 hours).
- Wait 6-12 hours.
- Go to step 3 when density drops to 1020 g/L.



STEP 3

Yeast Population Build-up
Keep at 20°C (68°F)

- Add 114 L of base wine and 76 L of chlorine-free water to step 2 (avoid thermal shock).
- Add 15 kg of sugar (density increases up to 1025-1030 g/L).
- Proceed with aeration (oxygen sparging or pump-over every 6 hours).
- Wait 24-48 hours.
- When density drops about 1000-1005 g/L, inoculate to the total volume of base wine. Do not let density drops below 1000 g/L.



STEP 4

Addition to Base Wine

- 1 kg of Nutriferm Tirage.
- 3 g/hL rehydrated Clairbouteille P
- Sugar 4g/L for each bar of pressure desired.
- Check that yeast inoculation rate must be 1-1.5 x 10^6 cells/mL

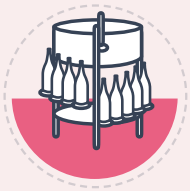
In Summary: What do you need?

EnartisFerm Perlage	0.5 kg
Nutriferm PDC	0.5 kg
Sugar	25 kg + 4 g/L each bar of pressure
Clairbouteille P	0.3 kg
Nutriferm Tirage	1 kg

SENSORY IMPROVEMENT PRODUCTS

Enartis has developed a range of products designed for the production of sparkling wines to "fine-tune," customize and improve wine profile to meet the needs of each market: softness, mouthfeel, elegance and finesse, foam quality, freshness or aromatic complexity.

These products can be added during *tirage* or with the *liqueur d'expedition* at disgorgement. Before using finishing products, we recommend setting up bench trials.

At *Tirage*		
	**SURLÌ MOUSSE**	Yeast derivative rich in mannoproteins, selected to improve the bubbling properties of sparkling wines. When used during second fermentation, it improves the bubble persistence in low-foaming potential wines or those with limited time of maturation on lees. Suitable for use in both Charmat and traditional methods, it also improves wine mouthfeel.
At *Tirage* or in the *Liqueur d'Expédition*		
	**ENARTISTAN STYLE**	Oak tannin, aromatically neutral, very soft and contributing just a little structure, it is used to limit the appearance of sulfur compounds during second fermentation in both traditional or Charmat methods.
	ENARTISTAN SLI	Tannin produced from untoasted American oak with a unique process that avoids the use of high temperatures. It displays an extraordinary capability of scavenging oxygen and radicals, chelating metals and slightly reducing wine redox potential. EnartisTan SLI can be used in synergy or as an alternative to SO_2 to protect wine from oxidation and to improve its shelf life.
	ENARTISTAN CIT	A blend of gallic and condensed tannins extracted from exotic species wood. The low temperatures used during the extraction process of the condensed tannin preserve some natural wood compounds that enhance the fruit and floral notes of the resulting wines.
	ENARTISTAN FF	Blend of condensed tannins extracted from exotic wood and white grape skin. EnartisTan FF has excellent antioxidant capacity. It freshens aroma, reduces overripe fruit notes, imparts softness and protects from oxidation.
	ENARTISTAN MAX NATURE	Mixture of condensed tannins formulated to increase aromatic cleanliness. In particular, it removes reductive and herbaceous characters, while highlighting fruit and floral notes, and increases mouthfeel without adding astringency.
	SURLÌ VELVET	Yeast mannoprotein complex designed to improve wine stability, Surlì Velvet increases the colloidal structure and enhances sensory characteristics including aromatic complexity, volume, and reduced astringency.
	CITROGUM PLUS	Solution of Arabic Gum Seyal and mannoproteins, Citrogum Plus has the ability to increase the sweet sensation without adding fermentable sugars.
	ZENITH PERLAGE	Solution of A-5D K/SD potassium polyaspartate (KPA), mannoproteins and sulfur dioxide, Zenith Perlage was specifically designed to prevent potassium bitartrate precipitation in sparkling wines and improve perlage stability. It does not modify wine sensory and filterability, even at low temperatures.

WHICH PRODUCT FOR WHICH SPARKLING WINE STYLE

	FRESH, FRUIT FORWARD, MODERN	AGED, CLASSIC, COMPLEX
ENARTISFERM PERLAGE D.O.C.G	✓	
ENARTISFERM PERLAGE FRUITY	✓	
ENARTISFERM PERLAGE		✓
ENARTISPRO PERLAGE	✓	
NUTRIFERM PDC		✓
NUTRIFERM PDC AROM	✓	
NUTRIFERM TIRAGE		✓
NUTRIFERM REVELAROM	✓	
NUTRIFERM GRADUAL RELEASE	✓	
ENARTISTAN STYLE	✓	✓
ENARTISTAN MAX NATURE	✓	✓
ENARTISTAN SLI	✓	✓
ENARTISTAN CIT	✓	
ENARTISTAN FF	✓	
CITROGUM PLUS	✓	✓

WHICH PRODUCT FOR WHICH PRODUCTION METHOD

	TRADITIONAL METHOD	*CHARMAT* METHOD
ENARTISFERM PERLAGE D.O.C.G	♦	♦♦♦
ENARTISFERM PERLAGE FRUITY	♦	♦♦♦
ENARTISFERM PERLAGE	♦♦♦	♦♦♦
NUTRIFERM PDC	♦♦♦	♦♦♦
NUTRIFERM PDC AROM	♦	♦♦♦
NUTRIFERM TIRAGE	♦♦♦	♦
NUTRIFERM REVELAROM	♦	♦♦♦
CLAIRBOUTEILLE P	♦♦♦	
ENARTISTAN CLAIRBOUTEILLE	♦♦♦	
SURLÌ MOUSSE	♦♦	♦♦♦
ENARTISTAN STYLE	♦	♦♦♦
ENARTISTAN MAX NATURE	♦♦♦	♦♦
ENARTISTAN SLI	♦♦	♦♦♦
ENARTISTAN CIT		♦♦
ENARTISTAN FF	♦	♦♦
SURLÌ VELVET	♦♦	♦♦
CITROGUM PLUS	♦	♦♦♦
ZENITH PERLAGE	♦♦♦	♦♦♦

HOW TO PREPARE BASE WINE FOR SECOND FERMENTATION

1. Stabilization of Base Wine

Protein stability: Bentonite Fining Trials are intended to determine the amount of bentonite needed to stabilize a specific wine. The degree of stability needs to be determined in context of the winemaker's goal, the future of the wine or consumer expectations.

Microbial control: Good cellar hygiene, regular microbial monitoring, temperature, SO_2 and pH management are all important for microbial control. Even if still commonly used for microbial stability, sterile filtration reduces foaming capacity and foam quality by removing positively charged colloids. As an alternative to sterile filtration, EnartisStab Micro, a pre-activated chitosan fining agent, reduces spoilage microbe populations, while maintaining excellent foaming capacity.

Tartaric stabilization: Using colloidal stabilizers such as Cellogum LV20 or Zenith UNO allows winemakers to stabilize base wines, thus preventing crystallization during and after fermentation.

2. Improve Foaming Capacity of Base Wine

The quality of sparkling wine is visually assessed by its color, bubble behavior and foam retention. The two main parameters that define foam quality are bubble size and foam retention.

Foaming capacity can be improved by increasing the quantity of pro-foam agents such as colloids, mannoproteins and gum Arabic or by reducing the quantity of anti-foam agents, such as fatty acids, with fining.

3. Make Base Wine a Healthy Environment for Yeast

Before starting second fermentation, some parameters need to be checked in the base wine: no residual toxins from the first fermentation, low free SO_2 (<10 ppm), low total SO_2, low residual CO_2 and low alcohol (<11%).

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