AEB LEADS YOU THROUGH THE *sparkling wine universe*

TRUST AEB'S EXPERIENCE AND DISCOVER A COMPREHENSIVE RANGE OF EQUIPMENT AND PRODUCTS FOR SPARKLING.

AEB®

base wine

PREPARATION

01. PRESSING

02. CLARIFYING

03. PRIMARY FERMENTATION

04. ACIDITY AND MALOLACTIC FERMENTATION

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CARBONATION
stages

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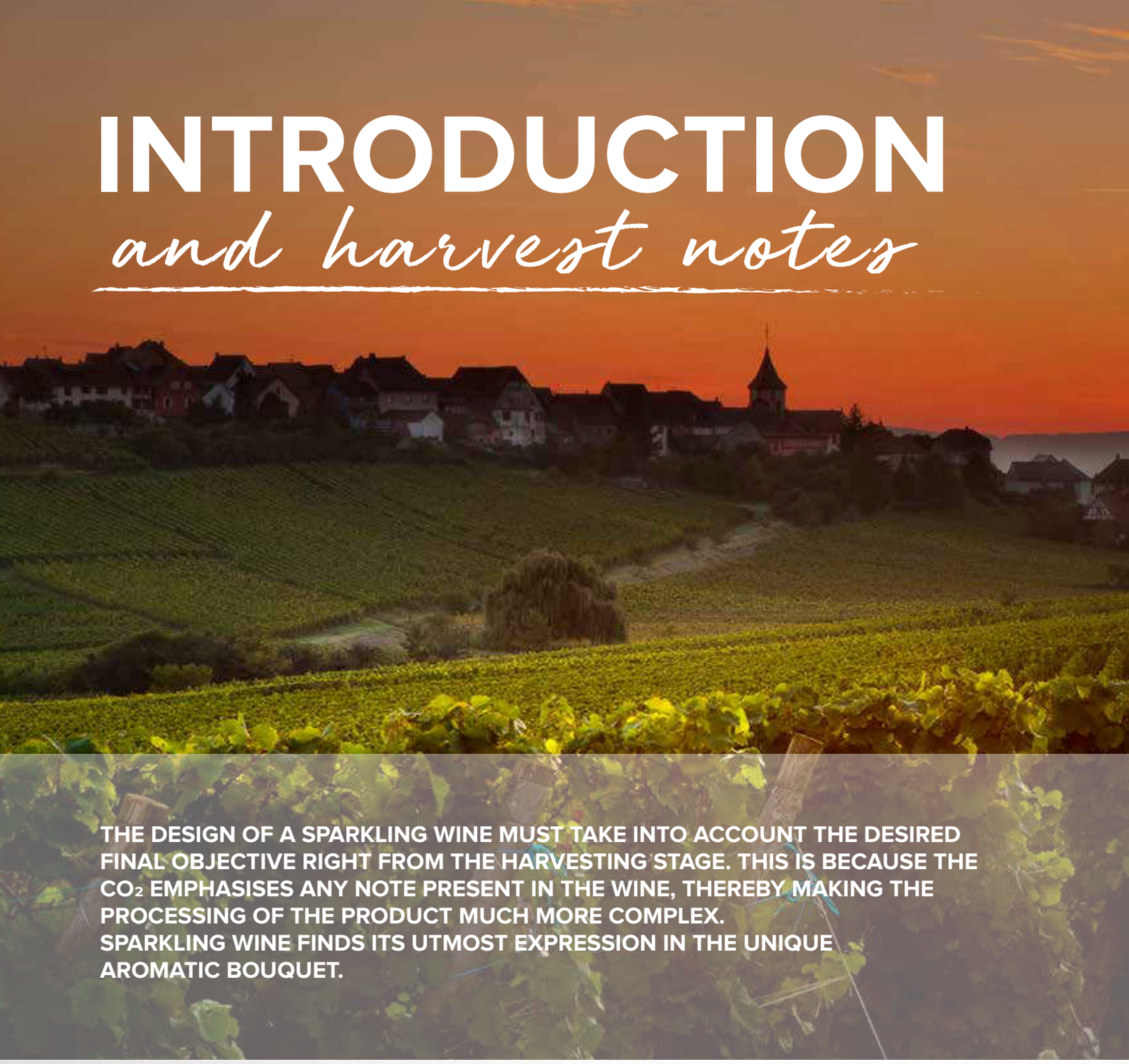
08. RIDDLING

09. DEGORGEMENT AND PREPARATION
OF THE LIQUEUR D'EXPEDITION

AEB®

INTRODUCTION
and harvest notes



THE DESIGN OF A SPARKLING WINE MUST TAKE INTO ACCOUNT THE DESIRED FINAL OBJECTIVE RIGHT FROM THE HARVESTING STAGE. THIS IS BECAUSE THE CO_2 EMPHASISES ANY NOTE PRESENT IN THE WINE, THEREBY MAKING THE PROCESSING OF THE PRODUCT MUCH MORE COMPLEX.
SPARKLING WINE FINDS ITS UTMOST EXPRESSION IN THE UNIQUE AROMATIC BOUQUET.

The **harvest date** is responsible for the balance between sugars and acids, phenolic and aroma maturity. On the other hand, the **harvesting method** directly influences the pressing; **manual harvesting** remains the ideal choice for producing **high quality spumante.**

From this point of view, a fundamental aspect to consider is the **integrity of the grape**, which is why the use of small containers for transport from the vineyard to the winery is preferred.

Mechanical harvesting has become a necessity in order to be competitive, especially in certain markets. Today's technologies make it possible to obtain high quality products with this harvesting method, as well. It is essential that the free run **must is separated** as soon as possible, and that the following steps are managed depending on the equipment at the winery.

MAIN ASPECT TO DEFINE SPARKLING WINE

PROFILES

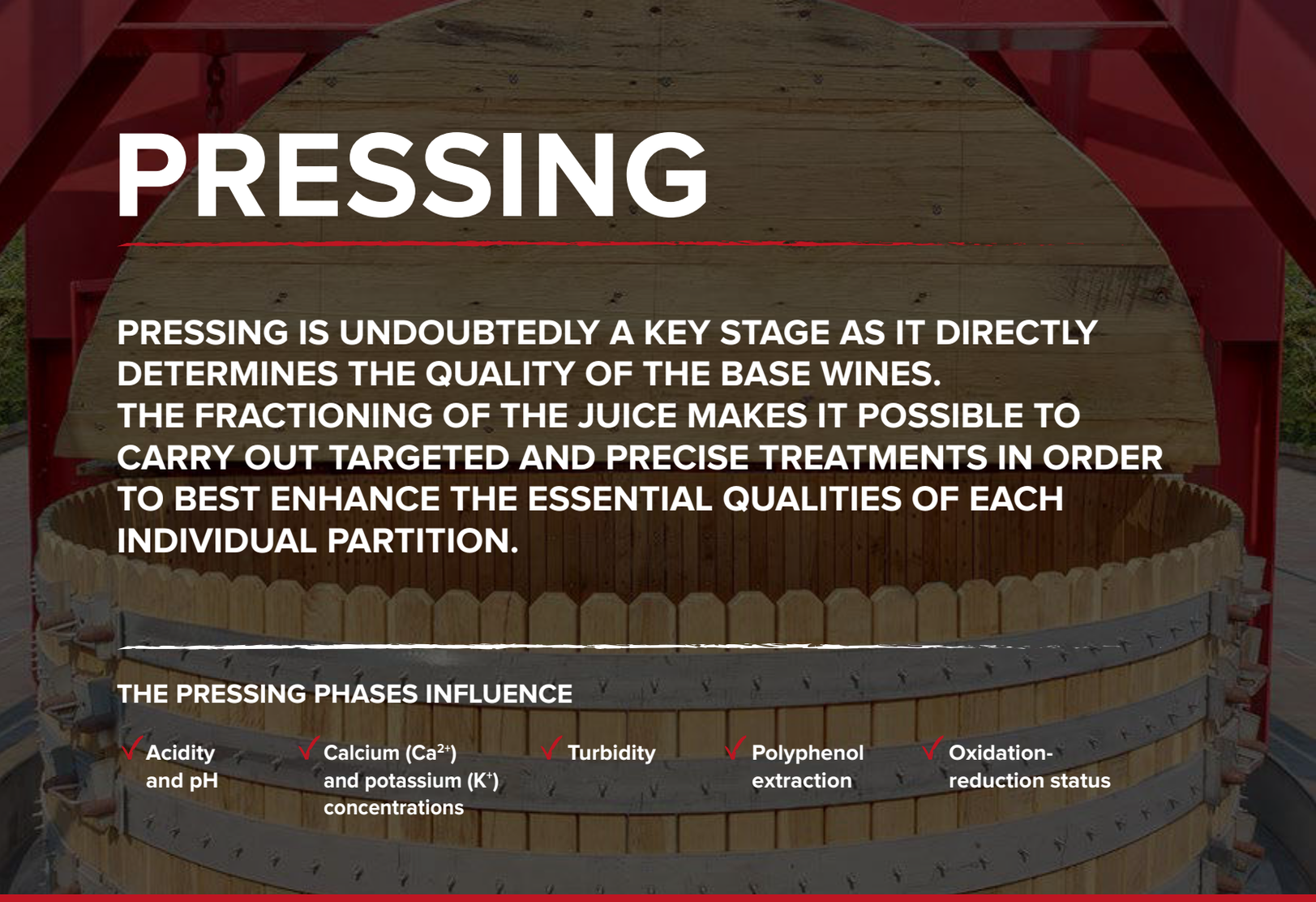
Fruity, floral, spicy. Or, depending on the desired imprint: primary, secondary or tertiary aromas.

TYPES OF PRODUCT

Pas Dosé, Extra Brut, Brut, Extra Dry, Dry, Demi-Sec, Dolce.

TYPE OF DOSAGE POST-REFERMENTATION

Maturation time, carbonation method, composition of the liqueur d’expedition.



PRESSING

**PRESSING IS UNDOUBTEDLY A KEY STAGE AS IT DIRECTLY DETERMINES THE QUALITY OF THE BASE WINES.
THE FRACTIONING OF THE JUICE MAKES IT POSSIBLE TO CARRY OUT TARGETED AND PRECISE TREATMENTS IN ORDER TO BEST ENHANCE THE ESSENTIAL QUALITIES OF EACH INDIVIDUAL PARTITION.**

THE PRESSING PHASES INFLUENCE

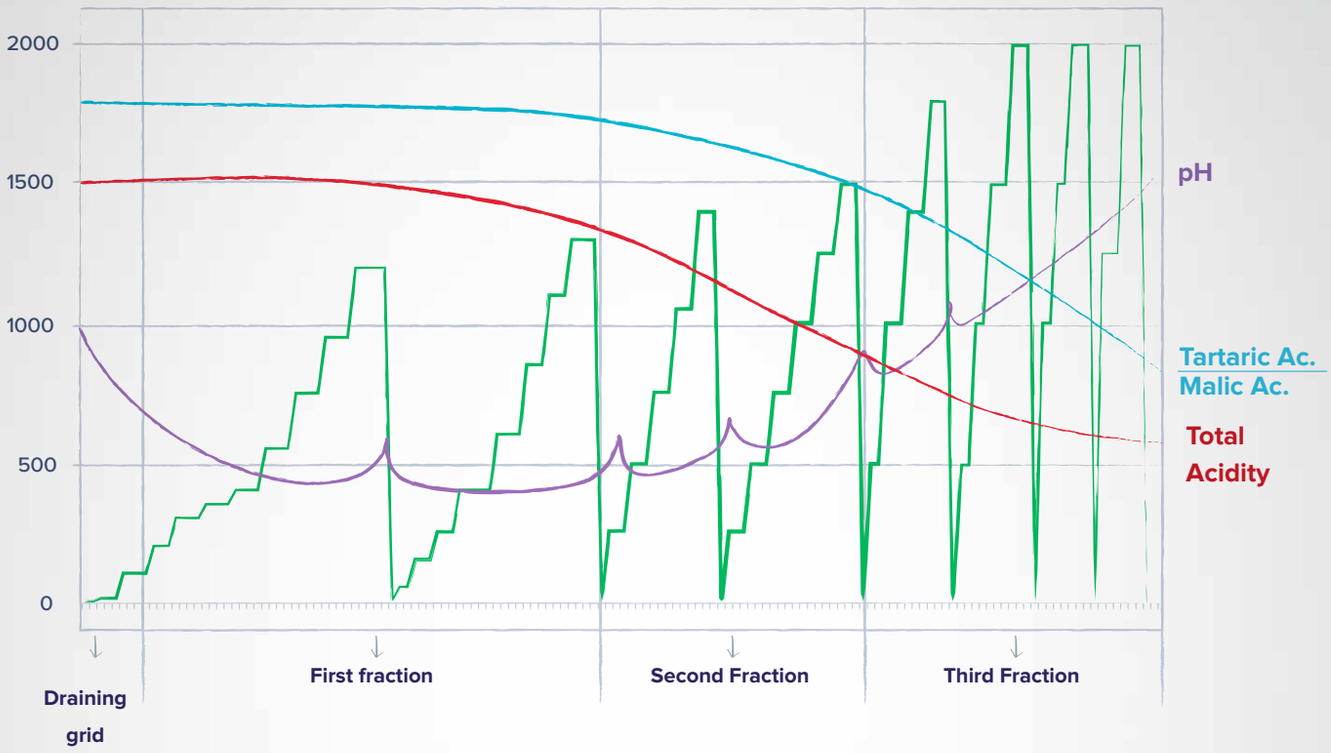
- ✓ Acidity and pH
- ✓ Calcium (Ca^{2+}) and potassium (K^{+}) concentrations
- ✓ Turbidity
- ✓ Polyphenol extraction
- ✓ Oxidation-reduction status

THE AEB GROUP'S TEAM HAS THE EXPERTISE TO SET UP A CORRECT PRESSING CYCLE ACCORDING TO THE QUALITY AND VOLUMES TO BE PROCESSED.

EXAMPLE OF FRACTIONING DURING PRESSING ON A 4,000 KG GRAPE BASE

Fractioning in the press stage for a quantity of 4,000 kg of grapes Yield considered: 64% approx.		OPTIMAL		GOOD		NORMAL	
		Vol. in litres	Vol. in %	Vol. in litres	Vol. in %	Vol. in litres	Vol. in %
FREE RUN		300	7,5	300	7,5	150	3,75
FIRST PRESSING CYCLE	Start	400	10	1600	40	2050	51,25
	End	600	15				
SECOND PRESSING CYCLE	Start	200	5				
	End	400	10				
THIRD PRESSING CYCLE	Start	50	1,25	400	10		
	End	350	8,75			350	8,75
HARD PRESS CYCLE	-	250	6,25	250	6,25		

VARIATION OF pH PARAMETERS, TARTARIC/MALIC RATIO AND TOTAL ACIDITY DURING A THREE-STAGE PRESSING CYCLE



DETAILS TO CONSIDER FOR THE DEVELOPMENT OF A PROPER *pressing cycle*

- Threshold pressure for grape berry burst
- State of turgidity of the grape berry
- Homogeneity of maturation (to be taken into account as soon as the plant flowers)
- Skin thickness.

Correct must management lays the foundations for obtaining a good sparkling wine. Through the juice fractioning we can intervene in a targeted manner to optimise each individual juice fraction.

CLARYFING

CLARIFICATION AFFECTS NOT ONLY THE ASPECTS OF PRESSING, BUT ALSO THE CONDITION OF THE GRAPES.

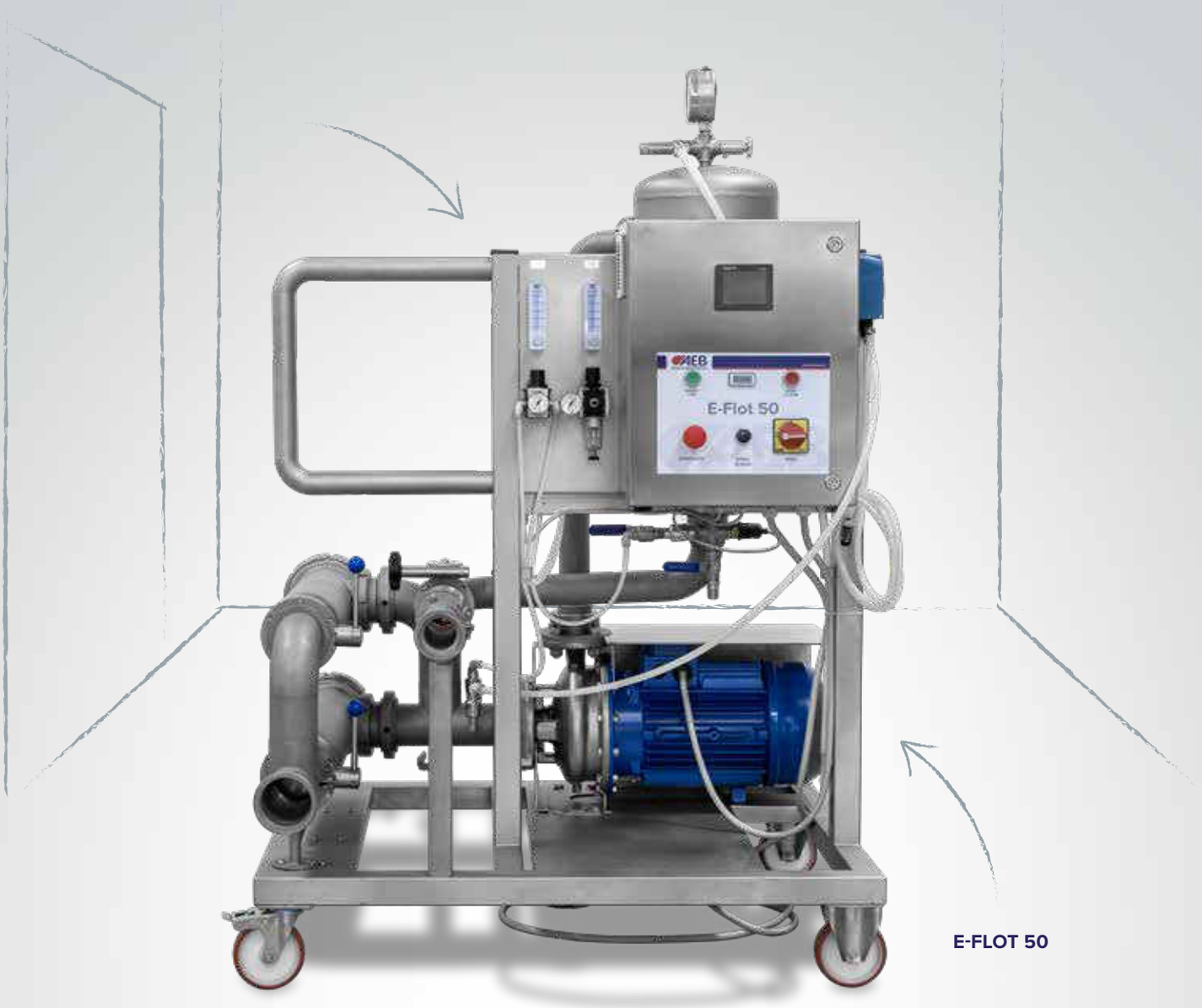
FACTORS INFLUENCED BY CLARIFICATION:

- ✓ **Elimination of pesticides**
- ✓ **Excess polyphenols**
- ✓ **Reduction of foam formation inhibitors**
- ✓ **Elimination of indigenous microbial flora**
- ✓ **Aromatic bouquet of the wine**

THE AEB OFFER INCLUDES BIOTECHNOLOGICAL PROCESSING AIDS TO ADDRESS ANY PROBLEMATIC SITUATION FROM OXIDATION TO SPONTANEOUS FERMENTATIONS, TO OBTAIN PERFECTLY CLEAR MUSTS.

MUST FINING RECOMMENDATIONS

AGENT	PROBLEMATICS	CORRECTIVE ACTIONS AND RECOMMENDED PRODUCTS
Copper	Oxidations, presence of antifermentative agents	Reductive fermentation, **adsorbent agents**
Microflora	Start of spontaneous fermentation	**Bioprotection** or sulphur dioxide, **clarification** or **filtration**
Oxidised polyphenols	Oxidative alterations	**Tannins** and fining agents
Pesticide	Presence of antifermentative agents	Treatment with **adsorbents**
Pectins	Must clarification	Clarification with **pectolytic enzymes** followed by **sedimentation** or **flotation**



E-FLOT 50

E-FLOT

E-FLOT IS USED IN THE MUST CLARIFICATION PROCESS BECAUSE IT LIMITS THE USE OF OENOLOGICAL PRODUCTS AND ALLOWS OPTIMAL CLARIFICATION IN A SHORT PERIOD OF TIME.

CLARIFICATION BY FLOTATION

- Fast clarification
- Optimal management of wine tanks
- Ideal degree of must limpidity
- Rapid elimination of indigenous flora
- Reduced refrigeration costs resulting in low energy consumption.

STATIC CLARIFICATION

- No equipment required
- Longer contact times
- Need for low temperatures
- Need to protect wine from oxidation
- Risk of spontaneous fermentation.

PRIMARY FERMENTATION

DURING BASE WINE FERMENTATION, FOR THE PRODUCTION OF QUALITY SPARKLING WINE, COMPLEXITY IS THE AIM RATHER THAN AROMATIC INTENSITY.

GOOD AROMATIC QUALITY IS LINKED TO NITROGEN LEVELS, TEMPERATURE BUT ALSO TARGETED NUTRITION BASED ON GRAPE VARIETY.

AEB OFFERS A COMPLETE AND BALANCED RANGE OF NUTRIENTS TO ACHIEVE THE DESIRED GOAL:

- ✓ **Rehydration nutrients with specific amino acids, rich in sterols and glutathione**
- ✓ **Nutrients for the enhancement and emphasis of the varietal profile**
- ✓ **Fully soluble specific nutrients for refermentation**

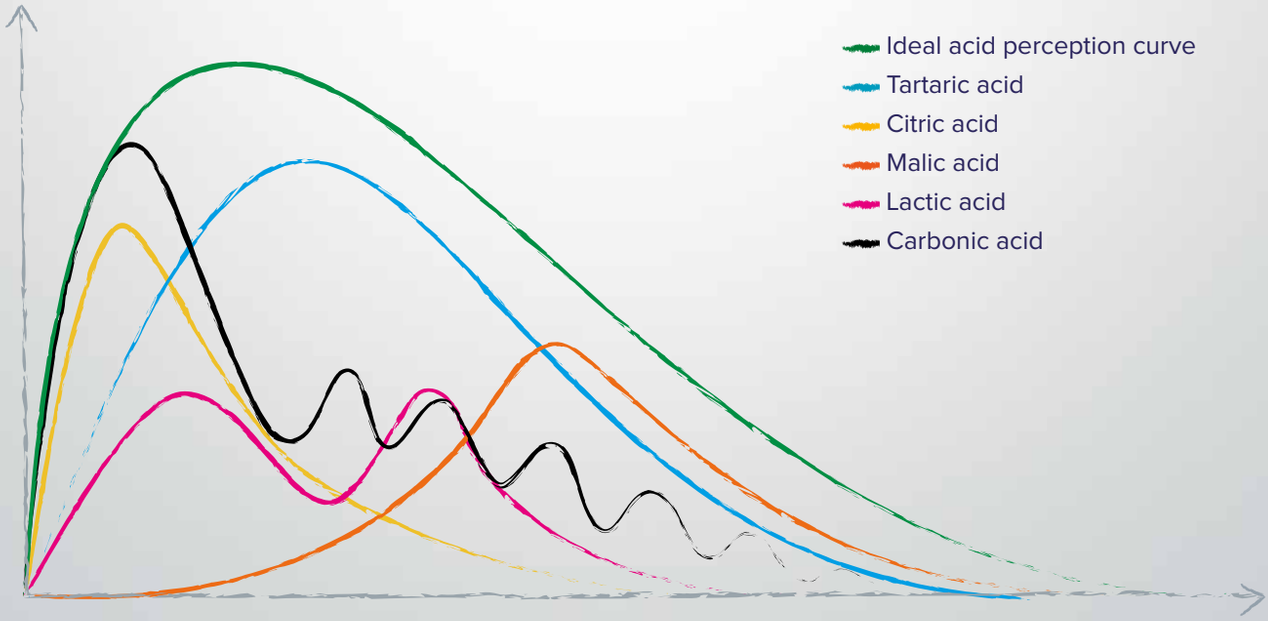
ACIDITY *management*

CONSIDERING JUST ACIDITY IN A SPARKLING WINE IS TOO GENERIC FOR THE RELEVANCE THIS CHARACTERISTIC HAS. IN THESE TYPES OF WINES, IT IS MORE CORRECT TO SPEAK OF THE SPARKLING WINE'S ACID STRUCTURE.

TOTAL ACIDITY IS A MEASURE OF DISSOLVED ORGANIC ACIDS,EACH OF WHICH HAS ITS OWN ORGANOLEPTIC CHARACTERISTICS.

THE AEB RANGE INCLUDES ALL PRODUCTS TO REPLENISH THE LACK OF ACID STRUCTURE OR THE NEED FOR DEACIDIFICATION.

TASTE DIAGRAM OF ORGANIC ACIDS IN WINE



MALOLACTIC *fermentation*

THE CHOICE TO UNDERGO MALOLACTIC FERMENTATION HAS AN IMPORTANT IMPACT ON THE DEVELOPMENT OF THE SPARKLING WINE.

IN ADDITION TO A COMPLETE RANGE OF LACTIC ACID BACTERIA, AEB HAS SPECIFIC YEASTS CAPABLE OF DECREASING MALIC ACID WITHOUT PRODUCING LACTIC ACID.

In general, the **degradation of malic acid** is an oenological choice that makes it possible to add volume and mellow sensations, rebalance the ratio with the tartaric acid, correct excessive acidity and compensate for the bitter finish in the mouth.

Clearly, this fermentation process **have to take into account the pH and acidity** of the finished wines in order to bring these advantages. Normally, in warmer production areas, the use of this technology is limited.

pH *management*

THE pH IS AN IMPORTANT FACTOR IN THE DEVELOPMENT OF SPARKLING WINE

PARAMETERS THAT THE pH ACTS ON:

- ✓ Microbiological Stability
- ✓ Tannin/ protein reactivity
- ✓ Oxidability
- ✓ Equilibirum between free and molecular SO_2
- ✓ Colour stability

STABYMATIC 200 ECO C

STABYMATIC 500

STABYMATIC

STABYMATIC IS AN AUTOMATIC CATION EXCHANGE SYSTEM FOR LOWERING pH AND TARTARIC STABILITY. THIS EQUIPMENT GUARANTEES:

- Stabilize and correct the pH through cation exchange.
- An early lowering of the pH increases the molecular fraction of SO_2 and the reactivity of the proteins with tannins.
- The improvement of tartaric stability by eliminating excess calcium (Ca^{2+}) and potassium (K^{+}).

The treatment with Stabymatic can be done recirculating the tank by setting the pH you want to achieve, or during transfer.

WINE PREPARATION *for refermentation*

**CARBONATION IS A PROCESS THAT MAKES A DECISIVE CONTRIBUTION TO THE QUALITY OF WINE.
THE CHEMICAL COMPOSITION OF THE BASE WINE BEFORE CARBONATION CAN DEPEND ON SEVERAL FACTORS. IT IS ESSENTIAL TO HAVE BALANCED ACIDITY, LOW pH,
A MODERATE ALCOHOL LEVEL, AS WELL AS AN AROMATIC PROFILE COMPATIBLE WITH THE BOUQUET THAT DEVELOPS DURING THE CARBONATION PROCESS.**

AEB OFFERS A COMPLETE RANGE OF TANNINS, ACTIVATORS AND NUTRIENTS, WHICH ARE ESSENTIAL FOR A SUCCESSFUL FERMENTATION PROCESS.

THE PRODUCTS FOR AN OPTIMAL PREPARATION OF THE WINE FOR CARBONATION

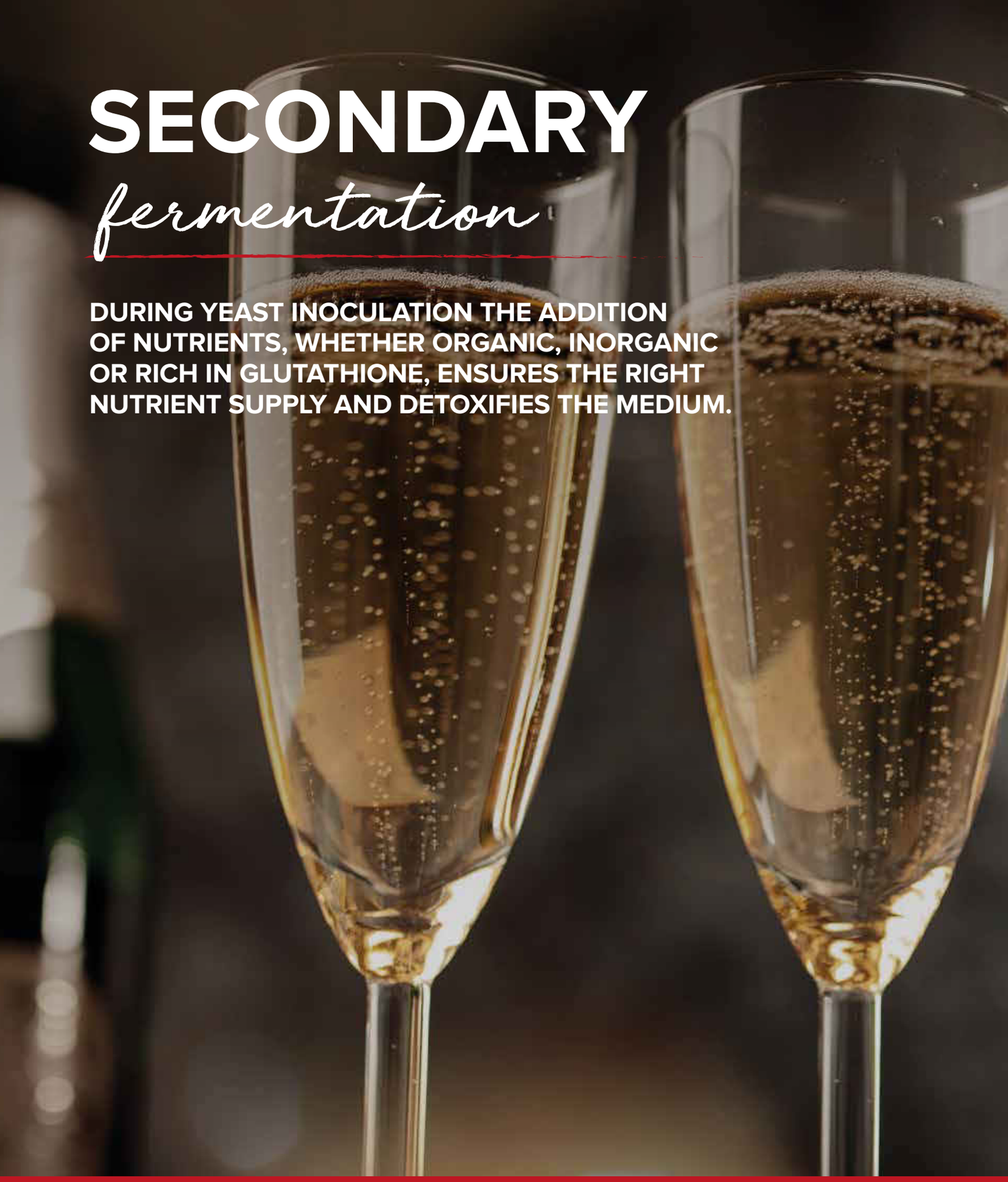
TANNINS	YEAST DERIVATIVES	NUTRIENTS
The **ellagic and proanthocyanidic tannins** improve the polyphenolic component, help the management of the redox balance, facilitate yeast sedimentation and increase the elasticity of bentonite/alginate deposits.	They regulate the redox balance, provide antioxidant molecules and soften the wine. At the same time, they provide yeast notes that can be traced back to the aging on lees (bread crust).	They ensure the correct and linear course of alcoholic fermentation, even by preventing its interruption. They reduce the formation of reduced notes.

PRESSURE TANK DOSING UNIT

THE SAME PRINCIPLES USED IN THE TRADITIONAL METHOD APPLY TO SPARKLING WINE MADE WITH CHARMAT METHOD.

In this case, the dosage of liquid or pre-solubilised powder products can be carried out directly in the pressure tank.

The pressure tank dosing unit, thanks to its injection up to 7 Bar, allows to add products throughout the sparkling wine process, regardless of the pressure increase.



SECONDARY *fermentation*

DURING YEAST INOCULATION THE ADDITION OF NUTRIENTS, WHETHER ORGANIC, INORGANIC OR RICH IN GLUTATHIONE, ENSURES THE RIGHT NUTRIENT SUPPLY AND DETOXIFIES THE MEDIUM.

AEB PROPOSES A RANGE OF CARBONATION YEASTS SUITABLE FOR BOTH CHARMAT AND CHAMPENOISE FERMENTATION, ENABLING THE WINEMAKER TO OBTAIN THE DESIRED RESULT.

REACTIVATEUR 60-2000 RIF

the REACTIVATEUR 60 *line*

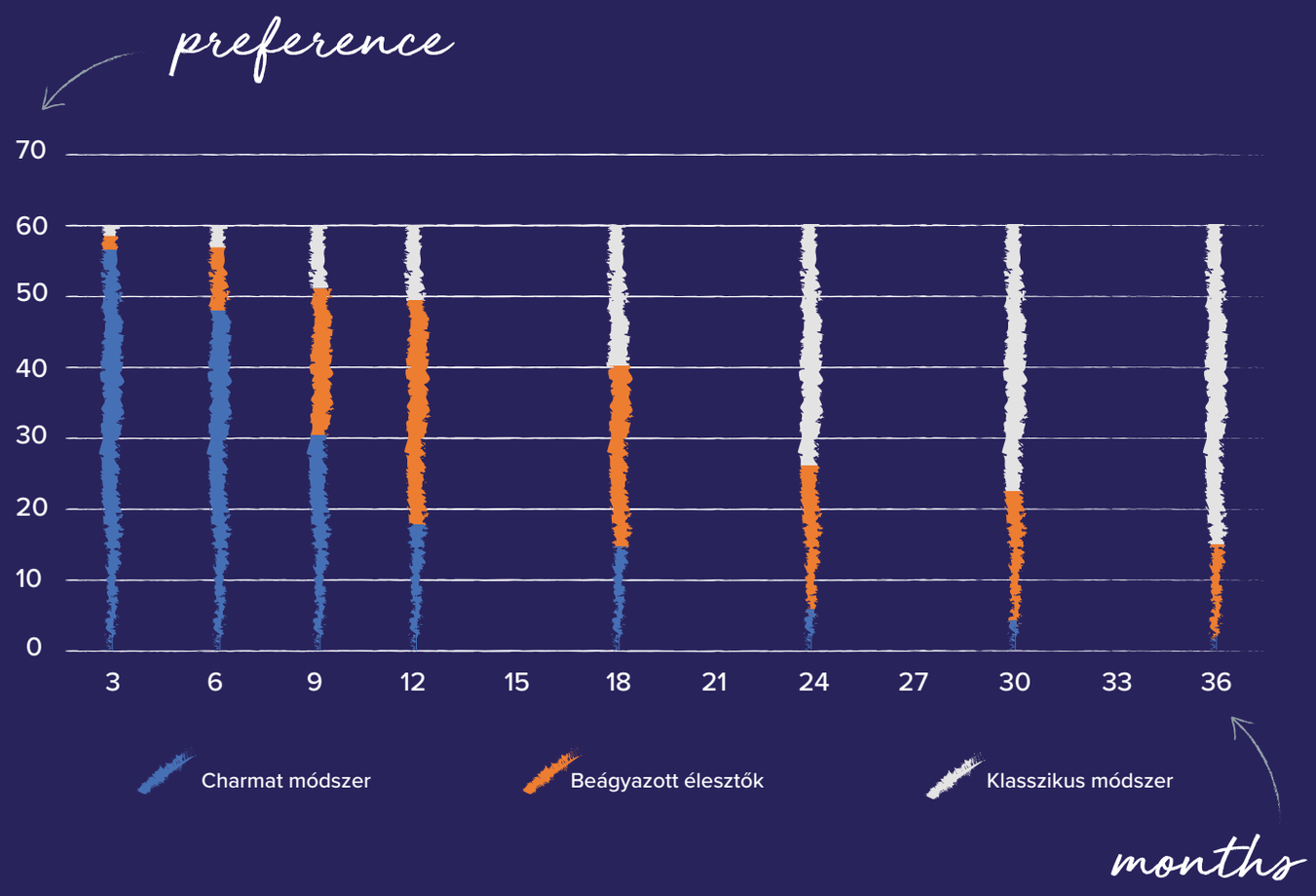
AEB has developed the range of **Reactivateur 60** and **Reactivateur 60 RIF** models to optimize the fermentation process both for the production of the base wine and for the second fermentation, to eliminate the need to carry out a pied de cuve, with all the consequent advantages and reduced risks.

Contrarily to what is commonly thought, carbonation does not have such an important impact on the definition of the aromatic profile. In fact, in addition to the fermentation of the base wine - which is a key factor - the bouquet is mostly affected by **any period of aging in barriques and on the lees**, which guide the **qualitative development of the wine over time.**

When defining the method of carbonation, it is essential to analyse the **infrastructural/technological aspects** of the winery, the **period of maturation on the lees and the type of dosage of the liqueur** at bottling.

Each sparkling wine is the result of a well-defined project of which fermentation technology is an integral part. The **Charmat** method is ideal if you want **short production times and rapid marketing**; whereas, if the aim is to obtain a **more complex sparkling wine**, also due to longer aging processes, the **Classical** method is the most suitable.
However, the possibility of producing a **Charmat sparkling wine with more complex notes**, thanks to prolonged development on the refermentation lees, should not be underestimated. The global sparkling wine market has great interest in product such as this.

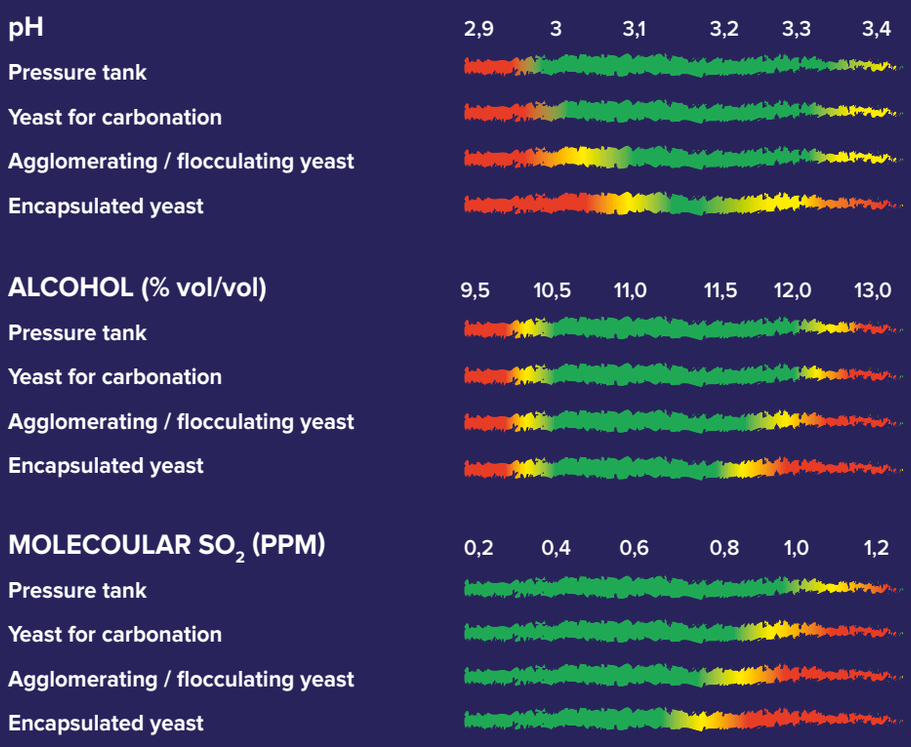
THE GRAPH SHOWS THE PREFERENCE OVER TIME FOR SPARKLING WINE MADE USING THE CHARMAT, TRADITIONAL OR ENCAPSULATED YEAST METHODS.



THE SUCCESS OF CARBONATION NOT DEPENDS ONLY ON A SINGLE PARAMETER, BUT ON THE VARIETY OF FACTORS WHICH INFLUENCE THE PHYSIO-CHEMICAL BALANCE OF THE WINE:

- Initial alcohol
- pH
- Sulfur level
- Tartaric and protein stability
- Refermentation temperature.

PARAMETERS THAT INFLUENCE THE FERMENTATION: RANGE OF SUITABLE VALUES IN GREEN, CRITICAL RANGE OF VALUES IN YELLOW AND ORANGE, EXTREME VALUES IN RED.

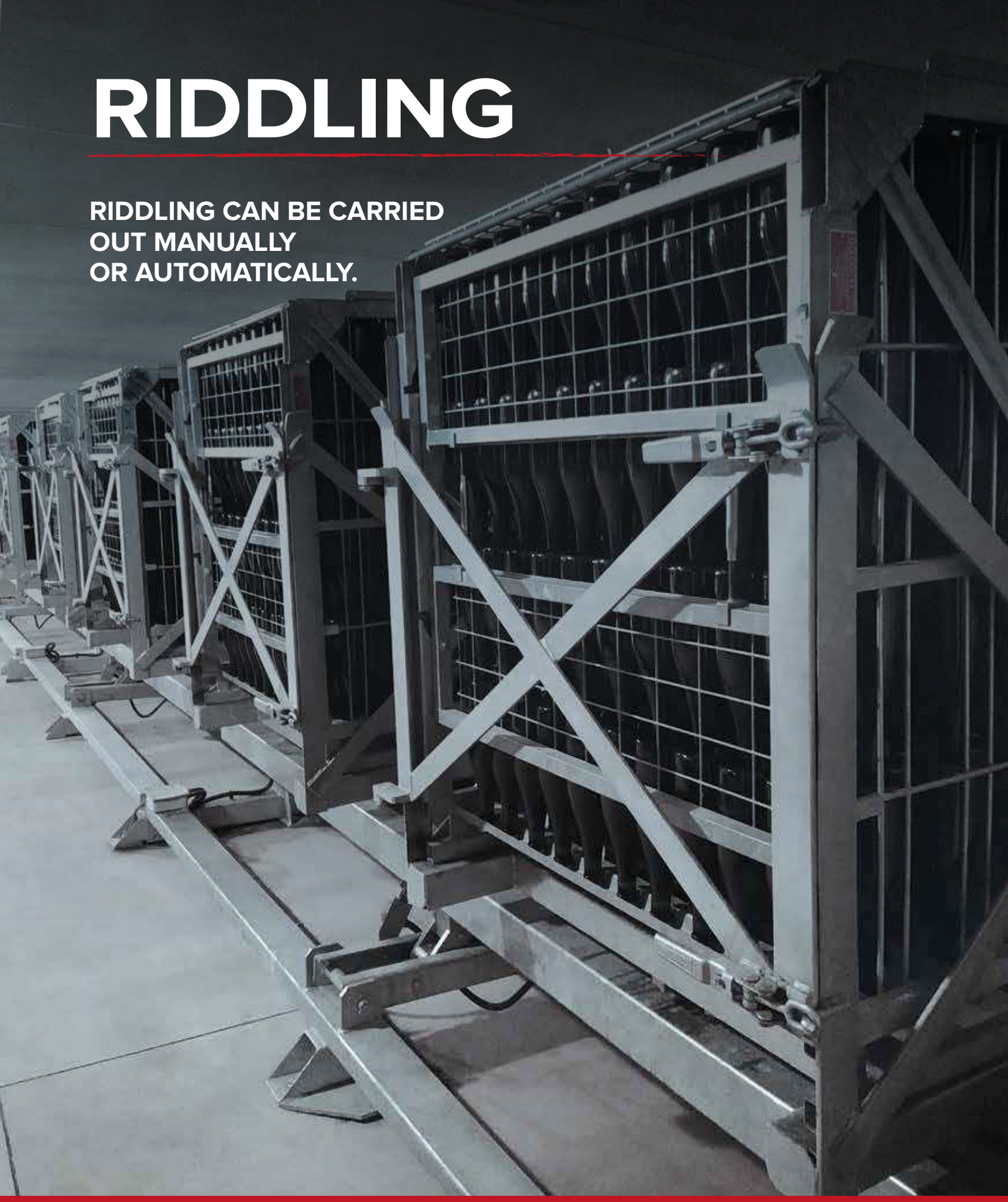


ADVANTAGES AND CRITICAL POINTS OF THE USE OF THE THREE DIFFERENT TYPES OF REFERMENTATION YEASTS

TRADITIONAL REFEREMENTATION YEASTS	✓ Wide range of applications ✓ Excellent aging characteristics that preserve the freshness of the wine ✓ Easy to multiply ✓ Aromatic freshness thanks to the limited risk of reduced notes	x Need for an optimal pied de cuve (the use of the **Reactivateur 60** or **Reactivateur 60 REF** is recommended) x Must be combined with a riddling agent x Extended processing times of the product
AGGLOMERANT YEASTS	✓ Wide range of applications ✓ Riddling time reduced to 24 or even 48 hours with very low turbidity ✓ Safe fermentation even with inoculations with low cells count inoculation ✓ Limited investment in riddling equipment thanks to rapid set up and tuning	x Need for an optimal pied de cuve (the use of the **Reactivateur 60** or **Reactivateur 60 REF** is recommended) x Optimal hygiene in preparing the pied de cuve to avoid even the slightest contamination by other yeasts that would cause the flocculant character to be lost
ENCAPSULATED YEASTS	✓ Homogeneity of the batch and easy dosage ✓ Preparation of the pied de cuve is not necessary, thereby reducing the risk of contamination by undesirable unwanted microorganisms ✓ Lower economic impact due to reduced use of equipment ✓ Application in the ancestral method with no riddling ✓ Easy bottle handling ✓ Rapid autolysis with reduced maturing time	x Limited impact on the colour of the rosés x Limited range of alcohol, pH, SO2 and precise temperature control x Post-filtration and pre-bottling hygiene are imperative x Necessary protein and tartaric stability of base wine

RIDDLING

RIDDLING CAN BE CARRIED OUT MANUALLY OR AUTOMATICALLY.



AEB RECOMMENDS SPECIFIC RIDDLING AIDS AS WELL AS ENCAPSULATED YEASTS WHICH SETTLE INSTANTLY.

DEGORGEMENT *and preparation of the* LIQUEUR D'EXPEDITION

THE CUVÉE IS KNOWN FOR ITS SUGAR CONCENTRATION, WHICH WILL DETERMINE THE CLASSIFICATION OF THE SPARKLING WINE DEPENDING ON THE RESIDUAL SUGAR: PAS DOSÉ, EXTRA BRUT, BRUT, EXTRA DRY, DRY, DEMI-SEC, SWEET.

The **liqueur d'expedition** is not intended to give the cuvée its own imprint, but to correct any imbalances, enhancing the work carried out previously in all stages of the process.
Only in certain cases the liqueur can become the signature of the "Maison".

Each liqueur has its own peculiarities and is specific to the sparkling wine in which it is intended to be dosed, because its purpose is to **compensate for imbalances and correct any small defects**.
For the development of the liqueur it is important to start from aspects linked to the physio-chemical balance of the cuvée and to the final taste result.

SOME RELEVANT ASPECTS ARE:

- The redox potential
- The search for optimal balance
- The correction of instabilities
- The consumer's "taste".

One aspect that we must not underestimate in sparkling wines is the ideal serving temperature, which has an impact on organoleptic perceptions. Therefore, when designing the liqueur, it will be essential to take this parameter into account.

MAIN PARAMETERS AFFECTING THE LIQUEUR AND RECOMMENDED ACTIONS

IMBALANCE	DESCRIPTION	CORRECTIVE ACTIONS AND RECOMMENDED PRODUCTS
OXIDATION	Aged wine, lack of aromatic freshness.	**Tannins, ascorbic acid and sulphur dioxide, bâtonnage** with **yeast derivatives.**
REDUCTION	Wine with perception of sulfurous notes	**Copper-based products, micro-oxygenation.**
ALCOHOL	Hotness sensation caused by the excessive perception of alcohol.	If unbalanced, it can be compensated for at disgorgement by improving the tannic structure or by adding **gum arabic.**
POLYPHENOLIC	Excessive astringency, imbalance in the body.	Clarifying products such as **gelatine** or **isinglass** for astringency reduction. Increasing the polyphenolic component with **tannins**. Addition of **yeast derivatives rich in mannoproteins.**
ACID	Depends on the grape variety, the vintage, the fractions made and the residual sugar content. It must be harmonised with the body and tannic structure.	Can be balanced with **mixtures of organic acids**, with **tannins**, with the addition of **gum arabic** or in a mixture with **yeast derivatives**.

FOR SUGAR ENRICHMENT OF THE LIQUEUR, THREE TYPES OF INGREDIENTS CAN BE USED:

- Refined beet sucrose
- Cane sugar
- Rectified concentrated must.

Refined sugar only provides true sweetness after undergoing hydrolysis. The use of sucrose therefore requires a rest period between disgorging and marketing.

The **level of refinement** directly influences the **aromatic purity**. Beet sugar could bring an earthy taste, contrarily to **cane sugar**, which may impart a slight toasted character.

Concentrated and rectified must is naturally and immediately balanced in glucose and fructose. Its sweetening power is immediate and the resting time before marketing can be shorter.

RESIDUAL SUGARS IN THE DIFFERENT TYPES OF SPARKLING WINES

SPARKLING WINE DEFINITION	g/L OF SUGAR
Brut Zero or Brut Nature	< 2 g/L
Extra Brut	< 5 g/L
Brut	< 12 g/L
Extra Dry	From 12 to 17 g/L
Sec	From 17 to 32 g/L
Demi-Sec	From 33 to 50 g/L
Sweet	> 50 g/L

THE TWO PROCESSES AND THE PRODUCTS RECOMMENDED FOR THE PRODUCTION OF SPARKLING WINES WITH THE CHARMAT METHOD

PRIMARY FERMENTATION & CARBONATION		CONTINUOUS VINIFICATION	
ALCOHOLIC FERMENTATION	Rehydration nutrient 10 g/hL	ALCOHOLIC FERMENTATION AND CARBONATION	Rehydration nutrient 10 g/hL
	AF yeast 10 g/hL		AF yeast 10 g/hL
	Inorganic nutrient 10 g/hL		Inorganic nutrient 10 g/hL
	Complex/organic/varietal nutrient 30 g/hL		Complex/organic/varietal nutrient 30 g/hL
TIRAGE	Refining yeast derivative 10 g/hL		Yeast for carbonation 5 g/hL
	Sugar		Specific nutrient for sparkling wine 10 g/hL
	Carbonation yeast 10 g/hL		Yeast derivative for aging 10 g/hL
CARBONATION	Specific nutrient for carbonation 10 g/hL		
	Yeast derivative for refinement 10 g/hL		
	Refining enzyme		Refining enzyme

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