Some unchangeable values are written into the genes at LAFFORT®: precision oenology® driven by the passion and innovation that have been motivating LAFFORT®’s men and women for more than 120 years.

Inspired by nature and supported by our R&D investments, this precision oenology® is in keeping with the uniqueness of your terroirs and with bringing out the typical character of your grape varieties.

LAFFORT® has been certified ISO 22000 since June 2018, guaranteeing the best control in terms of food safety. A necessary step as a manufacturer and in line with market needs. We keep a watch on new standards and norms, in order to better support you when putting your wines on the market.

We have designed our new website to better meet your expectations, with your own dedicated area: LAFFORT & YOU. This interactive library is constantly growing, with new applications and greater ease of use. We are also developing a dedicated site for NOBILE® this year, with its Decision Support Tool.

LAFFORT®, is also a team of motivated professionals at your service.

Wishing you an excellent 2019 vintage.

Philippe GUILLOMET
General Manager
ZYMAFLORE® CX9

The result of several years of research and development, ZYMAFLORE® CX9 originates from a mass selection from a great Burgundy vineyard and has taken advantage of breeding technology to offer improved fermentation performance, low volatile acidity production and POF negative character. This strain contributes to bringing out lemony, almond and toasty notes or fresh hazelnut in Chardonnay wines. Wines resulting from these fermentations are fine and elegant with a subtle blend of smoothness, aroma, tautness and mouthfeel.

P. 10

MANNOFEEL®

MANNOFEEL® results from LAFFORT® expertise in mannoproteins, their identification, understanding how they work and how to produce them. MANNOFEEL® mannoproteins contribute to stabilisation of tartrates and colloids in wine.

P. 48

NOBILE® SWEET VANILLA

Made exclusively from selected French oak, NOBILE® SWEET VANILLA chips are the result of a high-precision toasting process. Thanks to its novel composition, NOBILE® SWEET VANILLA contributes to the impression of sweetness and freshness in wine. It also contributes to the development of intense notes of Tahitian vanilla, while respecting the fruit.

P. 69

NOBILE® STAVE DULCE

To ensure its relevance to winemakers and to bring aromatic precision, NOBILE® STAVE DULCE is the result of a specific toasting process. Thanks to slow and gradual extraction, NOBILE® STAVE DULCE gives wines smoothness and aromatic complexity (dulce de leche, caramel) while respecting the fruit.

P. 71
LAFFORT® products now suitable for EU/ORGANIC.

With the change in European regulations on winemaking inputs authorised for organic vinification, the LAFFORT® list of products suitable for EU/ORGANIC has been extended as follows:

**Nutrients**
- NUTRISTART® AROM
- NUTRISTART® ORG
- NUTRISTART®

**Yeast products**
- MANNOFEEL®
- MANNOSTAB® LIQUIDE 200
- OENOLES® MP
- OENOLES®
- FRESHAROM®

**Vegetal proteins**
- VEGECOLL®
- VEGECOLL® LIQUIDE

**Microbiological stabilisation**
- OENOBRETT® ORG

See the full list of products suitable for organic use on our website [www.laffort.com](http://www.laffort.com)

---

20 YEARS OF EXTRALYSE®

EXTRALYSE®
20 years of speeding up nature!
- Accelerates yeast autolysis.
- Aids clarification.
- Improves filterability.
- Reduces the microbial load.

See our focus page 43.
## FERMENTATION PRODUCTS

### Yeasts

**Focus // Breeding**

- ZYMAFLORE® non-*Saccharomyces*  
- ZYMAFLORE® *Saccharomyces*  
- ACTIFLORE® range

### Nutrients

- Yeast performance optimisation  
- Yeast nutrition  
- Bacteria nutrition  
- **Focus // Nutrition**

### Yeast products

- POWERLEES® ROUGE  
- OENOLEES®  
- FRESHAROM®

### Bactéria

- LACTOENOS® range

### Enzymes

- Red winemaking  
- Red press wines  
- Maceration & pressing of whites & rosés  
- White & rosé wine clarification  
- **Focus // Difficult fining**  
- Specific applications  
- **Focus // 20 years of EXTRALYSE®**

### Tannins

- Fermentation tannins  
- **Focus // VR SUPRA® - VR COLOR®**

### Fining

- VEGECOLL® - Vegetal protein  
  *(Patatin, potato protein isolate)*  
- POLYMUST® range  
- Juice fining

### Specific Treatments
ZYMAFLORE®
Yeast excellence

<table>
<thead>
<tr>
<th>Yeast</th>
<th>Grape Variety</th>
<th>Alcohol Resistance* (%v/v)</th>
<th>Nitrogen Requirements</th>
<th>Optimal Fermentation Temperature °C</th>
<th>Fermentation Kinetics</th>
<th>Sensory Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHA</td>
<td>All grapes</td>
<td>8 -10%</td>
<td>Medium</td>
<td>10 - 26</td>
<td>Slow</td>
<td>Varietal Volume</td>
</tr>
<tr>
<td>F15</td>
<td>Merlot, Cabernet Sauvignon, Cabernet Franc, Pinot noir...</td>
<td>16%</td>
<td>Medium</td>
<td>20 - 32</td>
<td>Rapid</td>
<td>Fruit Volume</td>
</tr>
<tr>
<td>F83</td>
<td>Grenache, Carignan, Sangioveso, Mourvedre, Syrah, Merlot...</td>
<td>16.5%</td>
<td>Medium</td>
<td>20 - 30</td>
<td>Regular</td>
<td>Fruit Volume</td>
</tr>
<tr>
<td>FX10</td>
<td>Cabernet Sauvignon, Petit Verdot, Malbec...</td>
<td>16%</td>
<td>Low</td>
<td>20 - 35</td>
<td>Regular</td>
<td>Neutral Volume</td>
</tr>
<tr>
<td>RB2</td>
<td>Pinot noir, Merlot, Gamay...</td>
<td>15%</td>
<td>Low</td>
<td>20 - 32</td>
<td>Regular</td>
<td>Varietal</td>
</tr>
<tr>
<td>RB4</td>
<td>Aromatic wines, &quot;primeur&quot; style...</td>
<td>15%</td>
<td>Low</td>
<td>20 - 30</td>
<td>Rapid</td>
<td>Fruity Primeur</td>
</tr>
<tr>
<td>RX60</td>
<td>Syrah, Grenache, Tempranillo...</td>
<td>16.5%</td>
<td>High</td>
<td>20 - 30</td>
<td>Regular</td>
<td>Varietal</td>
</tr>
<tr>
<td>XPURE</td>
<td>Terroir highlight</td>
<td>16%</td>
<td>Medium</td>
<td>15 - 30</td>
<td>Regular</td>
<td>Fruit Volume</td>
</tr>
<tr>
<td>CX9</td>
<td>Chardonnay</td>
<td>16%</td>
<td>Low</td>
<td>14 - 22</td>
<td>Regular</td>
<td>Varietal Volume</td>
</tr>
<tr>
<td>DELTA</td>
<td>Riesling, Pinot Gris, Viognier, Chenin, Vermentino, Gewurztraminer, Sauvignon Blanc</td>
<td>14.5%</td>
<td>High</td>
<td>14 - 22</td>
<td>Regular</td>
<td>Varietal</td>
</tr>
<tr>
<td>SPARK</td>
<td>Secondary fermentation (sparkling wines)</td>
<td>17%</td>
<td>Low</td>
<td>10 - 32</td>
<td>Rapid</td>
<td>Neutral</td>
</tr>
<tr>
<td>ST</td>
<td>Sweet wines</td>
<td>15%</td>
<td>High</td>
<td>14 - 20</td>
<td>Regular</td>
<td>Varietal</td>
</tr>
<tr>
<td>VL1</td>
<td>Chardonnay, Semillon, Riesling, Gewurztraminer, Chenin, Muscat...</td>
<td>14.5%</td>
<td>High</td>
<td>16 - 20</td>
<td>Regular</td>
<td>Varietal</td>
</tr>
<tr>
<td>VL2</td>
<td>Chardonnay Semillon, Viognier</td>
<td>15.5%</td>
<td>Medium</td>
<td>14 - 20</td>
<td>Regular</td>
<td>Varietal Volume</td>
</tr>
<tr>
<td>VL3</td>
<td>Sauvignon blanc, Colombard...</td>
<td>14.5%</td>
<td>High</td>
<td>15 - 21</td>
<td>Regular</td>
<td>Varietal Volume</td>
</tr>
<tr>
<td>X5</td>
<td>Sauvignon Blanc, Colombard, Rolle, Manseng, Riesling...</td>
<td>16%</td>
<td>High</td>
<td>13 - 20</td>
<td>Rapid</td>
<td>Varietal Esters</td>
</tr>
<tr>
<td>X16</td>
<td>Chardonnay, Chenin, Ugni blanc, Colombard...</td>
<td>16.5%</td>
<td>Medium</td>
<td>12 - 18</td>
<td>Rapid</td>
<td>Esters</td>
</tr>
</tbody>
</table>

ZYMAFLORE® EGIDE™ is not included in this table due to the fact that it is a bioprotective agent. Rather than for fermentation it is used to colonise the medium prior to using a fermentation yeast.

* Yeast alcohol tolerance depends on nutrition, temperature, etc. It is recommended to use SUPERSTART® ROUGE (for red wines) or SUPERSTART® BLANC (for white and rosé wines) and a higher yeast dose rate for wines with high alcohol potential.
BREEDING

- Consists in crossing yeast strains that have oenological characteristics of interest.
- The resulting strain combines the performances of 2 or more different strains.

DID YOU KNOW IT?

The choice of parental strains can be based on physiological criteria (fermentation performance, low VA and SO₂ production, release of aromas...) but also on genetic ones. In fact, a certain number of genetic characteristics (what we call QTL - Quantitative Trait Loci) are linked to physiological traits (phenotypes).

QTL MARKERS GUIDED BREEDING

When a given strain (strain A) needs to be improved on a particular characteristic present in a different strain (strain B), it is possible to perform genetic marker driven backcrossings. Once strain A is bred with strain B, the descendent strain carrying the QTL of interest is identified, then crossed again with strain A. This step is repeated until obtaining a descendent strain X carrying the majority of the genetic background of strain A but enriched with the characteristics of interest from strain B.

QTL MARKERS

Many research projects combining genomics and physiology have revealed genetic characteristics linked to physiological traits of oenological interest, named QTL (POF character, VA and SO₂ production, aroma production...). Therefore it is possible to search for yeast strains with specific genotypes of interest to use for breeding: selection guided by markers.

QTL USAGE

Allows to go beyond the analytical data based solely on fermentation phenotypes, therefore multiplying the possibilities for selecting parental spores. It also permits to better focus on areas of improvement in the selection process.

A strain carrying the majority of strain A genome, integrating the genetic fraction of strain B with the QTL of interest.
ZYMAFLORE® ÉGIDE<sup>TDMP</sup>  
A formulation of two strains (Torulaspora delbrueckii and Metschnikowia pulcherrima) in harvest bioprotection, grapes and juices, as an SO₂ reduction strategy.  
These strains selected from among the grape’s indigenous flora for their organoleptic neutrality will colonise the medium and control the microflora in the pre-fermentation stages.  
The association of these two selected strains ensures the protection of the must environment in diverse situations. From one side, through high SO₂ resistance and strong colonisation capability (Torulaspora delbrueckii), and from the other side, by allowing direct inoculation without rehydration and high cold resistance (Metschnikowia pulcherrima).  
The bioprotective effects of this preparation have been validated by the results of studies:  
• Colonisation of the medium without any detected fermentation activity (no assimilation of sugars or nitrogen, no difference in turbidity levels at the end of the settling process).  
• Restriction of the growth of indigenous flora.  
• Implantation of the inoculated Saccharomyces cerevisiae strain facilitated.  
Dosage: 2 - 5 g/hL of ZYMAFLORE® ÉGIDE<sup>TDMP</sup> directly, rehydrated or non-rehydrated, on grapes or must (healthy grapes). Use a dosage of 10 g/hL in case of temperature below 5°C. Next, inoculate with Saccharomyces cerevisiae (at usual dosage) to ensure complete alcoholic fermentation.

ZYMAFLORE® ALPHA<sup>TD N. SACCH</sup>  
Non-Saccharomyces yeast (Torulaspora delbrueckii) for a complex aromatic profile and increased mouthfeel. All grape varieties.  
• Increases aromatic complexity of both varietal and fermentation aromas.  
• Increases mouthfeel volume through high polysaccharides production.  
• Low volatile acidity production in high sugar and Botrytis infected musts.  
• Control of indigenous populations as part of a strategy to reduce SO₂ doses.  
• Controls microbial flora during pre-fermentation maceration.  
• Inoculate with a strain of Saccharomyces cerevisiae of your choice 24 to 72 hours after the addition of ZYMAFLORE® ALPHA to secure the completion of the alcoholic fermentation and to benefit from the sensory impact of ZYMAFLORE® ALPHA.  
Dosage: 30 g/hL for dry wines; 40 g/hL for desert wines.
**ZYMAFLORE® XPURE**

_Yeast for varietal red wines. Enhances aromatic purity._

- ZYMAFLORE® XPURE is suited to the production of red wines for full expression of the aromatic purity and potential of the grapes.
- Reduces the perception of vegetal characters.
- Promotes the expression of dark fruit and aromatic freshness.
- Allows the production of wines with great suppleness in the mouth and sweetness on the palate (Hsp12 protein).
- Excellent fermentation ability.

Dosage: 15 - 30 g/hL.

---

**ZYMAFLORE® FX10**

_Yeast for wines showing structured and silky tannins. Cabernet Sauvignon, Cabernet Franc, Merlot..._

- Fructophilic character.
- Improved cell viability at high fermentation temperatures.
- Preserves varietal specificity and terroir (very low production of fermentation aromas).
- Good for ageing on lees (liberation of Hsp12 protein gives perception of sweetness).
- High polysaccharide release (contributes to softening tannins).
- Helps to mask the perception of green characters.

Dosage: 15 - 30 g/hL.

---

**ZYMAFLORE® RX60**

_Yeast for fruity, spicy red wines. Syrah, Grenache, Tempranillo and fruit forward wines..._

- Very high aroma production (fresh currant and berry aromas).
- Low production of H₂S.
- LACTOENOS® 450 PREAC recommended in early co-inoculation to preserve aromatic freshness.

Dosage: 15 - 30 g/hL.

---

Consider SUPERSTART® ROUGE to optimise yeast viability in juice and must with high sugar concentration. See p.16.
ZYMAFLORE® F15
Yeast for rounded, full bodied wines. Merlot, Cabernet Sauvignon, Pinot Noir...
• Isolated from one of the best terroirs in Bordeaux.
• Broad aromatic spectrum.
• Fermentation security, high compatibility with bacteria strains.
• Produces wines suitable for extended ageing.
Dosage: 15 - 30 g/hL.

ZYMAFLORE® RB2
Yeast for fruity and elegant red wines. Pinot Noir, Nebbiolo, Merlot...
• Strain isolated from a premium estate in Burgundy.
• Low colour matter adsorbtion.
• Good aptitude for expressing typical aromas like cherry/kirsch.
Dosage: 15 - 30 g/hL.

ZYMAFLORE® F83
Yeast for supple, fruity and floral red wines. Grenache, Nebbiolo, Sangiovese, Tempranillo, Syrah...
• Strain isolated in Tuscany from Sangiovese.
• High production of red fruit aromas.
• Respects the typicity of Mediterranean grape varieties.
Dosage: 15 - 30 g/hL.

ZYMAFLORE® RB4
Yeast for aromatic wines, "primeur" style.
• Strain selected in Beaujolais.
• Important production of fermentation aromas such as red fruits.
• Ideal strain for rapid initiation of MLF.
• Aromatic and fruity wines.
Dosage: 15 - 30 g/hL.

THINK NOBILE®!
Supplementing the natural supply of ellagic tannins and polysaccharides, adding NOBILE® FRESH GRANULAR 24M (untoasted oak) during alcoholic fermentation can prepare your wine ageing while raising its aromatic potential and fruit expression.
Dosage: 2 to 4 g/L.
See p.69.
ZYMAFLORE® DELTA
Yeast for aromatic white and rosé wines. Riesling, Pinot Gris, Viognier, Chenin Blanc, Gewürztraminer...
- Complex and elegant wines, clean aromatic profile.
- High expression of citrus notes, especially grapefruit.
- Optimal conditions: 150 - 250 NTU turbidity.
- Very low formation of sulphur-containing compounds even at high turbidities.
Dosage: 20 - 30 g/hL.

ZYMAFLORE® X5
Yeast for aromatic white wines with excellent thiol expression. Sauvignon blanc, Pinot Gris, Riesling, Gewürztraminer & rosé...
- Strong expression of volatile thiols (boxwood, tropical fruits) and production of fermentation aromas.
- Fresh and complex wines.
Dosage: 20 - 30 g/hL.

SELECTING YOUR YEAST STRAIN FOR HIGH-THIOL WINE VARIETIES

<table>
<thead>
<tr>
<th></th>
<th>ZYMAFLORE® DELTA</th>
<th>ZYMAFLORE® X5</th>
<th>ZYMAFLORE® VL3</th>
<th>ZYMAFLORE® X16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varietal expression</td>
<td>***** (grapefruit / 3SH)</td>
<td>***** (boxwood / 4MSP)</td>
<td>*****</td>
<td>*</td>
</tr>
<tr>
<td>Production of fermentation esters</td>
<td>-</td>
<td>****</td>
<td>-</td>
<td>***</td>
</tr>
<tr>
<td>Aromatic intensity</td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
</tr>
<tr>
<td>Volume and sweetness on the palate</td>
<td>***</td>
<td>***</td>
<td>*****</td>
<td>-</td>
</tr>
<tr>
<td>Fermentative capability</td>
<td>***</td>
<td>*****</td>
<td>****</td>
<td>*****</td>
</tr>
<tr>
<td>Optimal conditions</td>
<td>150 - 250 NTU, 18 - 20°C</td>
<td>80 - 150 NTU, 16 - 20°C</td>
<td>100 - 150 NTU, 18 - 20°C</td>
<td>&lt;50 NTU, 18 - 20°C</td>
</tr>
</tbody>
</table>

To increase the thiols concentrations of your wine, think LAFAZYM® THIOLS[1].
**ZYMAFLORE® X16**
Yeast for modern and aromatic style white and rosé wines. Chardonnay, Viognier, Pinot Gris, Chenin Blanc, and Rosé...
- Very strong fermenter.
- High aromatic production (peach, white flowers, stone fruits).
- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- Low production of H₂S.
Dosage: 20 - 30 g/hL.

**ZYMAFLORE® CX9**
Yeast resulting from selection from a great Burgundy vineyard and breeding technology. Chardonnay...
- Develops notes of lemon, fresh hazelnut, almond and toast.
- Contributes to the balance between smoothness, tautness and mouthfeel.
- Very good fermentation ability.
- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- Particularly suited to Chardonnay vinification.
Dosage: 20 - 30 g/hL.

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### SELECTING YOUR YEAST STRAIN FOR CHARDONNAY WINES

<table>
<thead>
<tr>
<th>ZYMAFLORE®</th>
<th>ZYMAFLORE®</th>
<th>ZYMAFLORE®</th>
<th>ZYMAFLORE®</th>
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</thead>
<tbody>
<tr>
<td><strong>CX9</strong></td>
<td><strong>VL1</strong></td>
<td><strong>VL2</strong></td>
<td><strong>X16</strong></td>
</tr>
<tr>
<td>Varietal expression</td>
<td>***** (Lemon, hazelnut, almond and toasted bread)</td>
<td>**** (mineral, exotic fruits)</td>
<td>***</td>
</tr>
<tr>
<td>Production of fermentation esters</td>
<td>-</td>
<td>-</td>
<td><strong>(*)</strong></td>
</tr>
<tr>
<td>Aromatic intensity</td>
<td>***</td>
<td>***</td>
<td>****</td>
</tr>
<tr>
<td>Volume on the palate</td>
<td>***</td>
<td>*****</td>
<td>***</td>
</tr>
<tr>
<td>Fermentative capability</td>
<td>***</td>
<td>***</td>
<td>****</td>
</tr>
<tr>
<td>Ability to achieve MLF</td>
<td>*</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>
ZYMAFLORE® VL1
Yeast for elegant and refined white wines. Chardonnay, Riesling, Gewürztraminer, Muscat...
• POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
• High β-glucosidase enzymatic activity.
• Expression of floral terpene varietal aromas.
Dosage: 20 - 30 g/hL.

ZYMAFLORE® VL2
Yeast for delicate and clean barrel fermented wines. Chardonnay, Viognier...
• POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
• High polysaccharides production.
Dosage: 20 - 30 g/hL.

ZYMAFLORE® VL3
Yeast for wines of elegance and finesse with high expression of volatile thiols. Sauvignon Blanc, Gewürztraminer, Riesling, Colombard & Pinot Gris.
• Isolated from one of the best Sauvignon Blanc vineyards in Bordeaux.
• Good aptitude for expressing the varietal aromas such as volatils thiols from the odourless precursors in the must.
• Volume and roundness in the mouth.
Dosage: 20 - 30 g/hL.

ZYMAFLORE® ST
Yeast for sweet wines from Botrytised grapes. Late Harvest, Semillon, Riesling...
• Strain selected in Sauternes.
• Sensitive to SO₂ for arresting fermentation easily and low production of SO₂ binding compounds.
• Resistance to high sugar concentration.
Dosage: 20 - 30 g/hL.

THINK NOBILE®!
Supplementing the natural supply of ellagic tannins and polysaccharides, adding NOBILE® FRESH GRANULAR 24M (untoasted oak) during alcoholic fermentation can prepare your wine ageing while raising its aromatic potential and fruit expression.
Dosage: 0,5 to 2 g/L.
See p.69.
ZYMAFLORE® 011 BIO

This Saccharomyces cerevisiae strain has been selected for its remarkable fermentation capabilities, its high alcohol tolerance, its respect for varietal typicity, and its low production of medium-chain fatty acid compounds inhibiting malolactic bacteria.

Its alcohol tolerance makes ZYMAFLORE® 011 BIO well adapted to restarting stuck fermentations or re-inoculation in case of sluggish spontaneous fermentations to ensure a healthy completion of fermentation.

Dosage: 20 - 30 g/hL.
30 - 50 g/hL in case of stuck fermentation.

Find out more: Discover our YEAST REHYDRATION video on our website, at LAFFORT & YOU.

ORGANIC WINES

ZYMAFLORE® SPARK
Secondary fermentation and tough conditions.
• Still wine fermentation and secondary fermentation of sparkling wines.
• Resistant to difficult fermentation conditions (potential alcohol, turbidity, temperature).
• Tolerates high SO₂ and alcohol levels.

Dosage: 20 - 30 g/hL.
30 - 50 g/hL in case of stuck fermentation.

Tested and validated by the laboratory for microbiological technique pole CIVC.

See P 79 for the complete range of products for sparkling wines and LAFFORT® recommendations.
Inoculation with a selected yeast strain is part of the control of the alcoholic fermentation. Leaving the alcoholic fermentation to wild yeasts means taking a risk with both the fermentation (stuck ferment, increased VA, increased formation of combining compounds...) and with the aromas (many potential off-flavours). While the choice of yeast strain is essential, its establishment in the medium, its protection and its nutrition, to guarantee a smooth alcoholic fermentation up to completion, are also important. Following the yeast addition procedure is essential, to avoid population loss and to ensure it is properly established. ACTIFLORE® yeasts are technical tools for ensuring complete fermentation, without aromatic deviation, even under difficult conditions.

<table>
<thead>
<tr>
<th>YEAST</th>
<th>ALCOHOL RESISTANCE (%v/v)</th>
<th>NITROGEN REQUIREMENTS</th>
<th>OPTIMAL FERMENTATION TEMPERATURE (°C)</th>
<th>FERMENTATION KINETICS</th>
<th>AROMATIC IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO213</td>
<td>&gt; 18%</td>
<td>Low</td>
<td>10 - 32</td>
<td>Rapid</td>
<td>Neutral</td>
</tr>
<tr>
<td>CEREBISIAE</td>
<td>&gt; 13,5%</td>
<td>Low</td>
<td>20 - 30</td>
<td>Rapid</td>
<td>Fruity</td>
</tr>
<tr>
<td>F33</td>
<td>16%</td>
<td>Low</td>
<td>13 - 30</td>
<td>Regular</td>
<td>Fruity, Varietal</td>
</tr>
<tr>
<td>RMS2</td>
<td>17%</td>
<td>Low</td>
<td>10 - 30</td>
<td>Rapid</td>
<td>Neutral</td>
</tr>
<tr>
<td>ROSÉ</td>
<td>15%</td>
<td>Medium</td>
<td>13 - 18</td>
<td>Regular</td>
<td>Esters</td>
</tr>
</tbody>
</table>

* Yeast alcohol tolerance depends on nutrition, temperature, etc. It is recommended to use SUPERSTART® and a higher yeast dose rate for wines with high alcohol potential.

**ACTIFLORE® BO213**

_Fermentation restart and clean aromatic profile. - Fructophilic yeast._

• Very strong ability to restart sluggish or stuck fermentations.
• Excellent fermentation capacity.
• Ferments at low temperatures (10 - 12°C).
• Tolerates extremely high alcohol (18% v/v) levels.
• Bacteria compatible.
Dosage: 20 - 30 g/hL ; 30 - 50 g/hL for stuck fermentations.
See our AF restart protocol p 92.

*Find out more:* See our FERMENTATION RESTART PROTOCOL on our website, at LAFFORT & YOU.
**ACTIFLORE® F33**

Low VA, high polysaccharide release, fermentation security. Red & white wines.

- Superior balance & softness due to high polysaccharide release.
- Excellent fermentation characteristics & kinetics over a wide temperature range.
- Very good alcohol tolerance and low nitrogen demand.
- Very low VA production.

Dosage: 15 - 30 g/hL.

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**ACTIFLORE® ROSÉ**

Spicy and fruity notes.

- Excellent strain for the production of fruit-driven rosé wines, especially when they are made from grapes of low aromatic potential.
- POF(-) character (no vinyl phenol formation), generating a delicate and clean wine profile.
- Strong implantation ability and fermentation rates.
- Produces high levels of fermentation aromas.

Dosage: 20 - 30 g/hL.

---

**ACTIFLORE® RMS2**

Difficult conditions, low production of reduction compounds.

- Yeast selected for its superb white wine fermentation capabilities.
- Adapted to extreme white winemaking conditions (high volume, low turbidity, low temperature, anaerobic conditions).
- Very low production of H₂S.
- Also recommended for secondary fermentation of sparkling wines.

Dosage: 20 - 30 g/hL.

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**ACTIFLORE® CEREVISIAE**

Yeast starter.

- Yeast selected for a rapid fermentation start.
- Does not modify the varietal character of wines.

Dosage: 15 - 30 g/hL.
A stressful fermentation results in aroma defects and production of factors inhibiting bacteria. Yeast must have complete nutrition for a stress-free fermentation. Grape nutrition and nutrient additions need to be balanced in both growth and survival factors for the yeast to ensure a clean and strong fermentation finish.

For optimal nutrition and protection of yeast, LAFFORT® highly recommends rehydration with SUPERSTART®. Then add NUTRISTART® ORG, NUTRISTART® AROM or NUTRISTART® as required.

<table>
<thead>
<tr>
<th>OENOLOGICAL CONCERN</th>
<th>YEAST METABOLISM FACTOR</th>
<th>PRACTICAL RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular fermentation</td>
<td>Nutritional balance between mineral and organic nitrogen.</td>
<td>Partially or completely correct with organic nitrogen (not only with ammonium salts). Make two additions during the first third of fermentation.</td>
</tr>
<tr>
<td>Healthy fermentation completion</td>
<td>Yeast viability and vitality. Cell membrane resistant to acid and alcohol stresses.</td>
<td>Use yeast rehydration products during the rehydration phase to add sterols and long-chain fatty acids to strengthen the cell membrane.</td>
</tr>
<tr>
<td>Clean aromatic profile</td>
<td>Stress minimisation and good cell membrane permeability.</td>
<td>Rehydrate the yeast with specific rehydration nutrients. Add nutrients before mid-fermentation. Incorporate pantothenic acid (vitamin B5) from yeast nutrients to regulate and minimise H₂S production.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTION</th>
<th>PRODUCT</th>
<th>YAN CONTRIBUTION FROM 200 MG/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>SUPERSTART® ROUGE</td>
<td>Trace</td>
</tr>
<tr>
<td></td>
<td>SUPERSTART® BLANC</td>
<td>Trace</td>
</tr>
<tr>
<td></td>
<td>SUPERSTART® SPARK</td>
<td>Trace</td>
</tr>
<tr>
<td>Nutrition</td>
<td>NUTRISTART® AROM</td>
<td>14 mg/L (organic and mineral nitrogen)</td>
</tr>
<tr>
<td></td>
<td>NUTRISTART® ORG</td>
<td>10 mg/L (organic nitrogen)</td>
</tr>
<tr>
<td></td>
<td>NUTRISTART® THIAZOTE®</td>
<td>15 mg/L (organic and mineral nitrogen)</td>
</tr>
<tr>
<td>Detoxification and physical support</td>
<td>OENOCELL® BIO</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>OENOCELL® BI-ACTIV®</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>TURBICEL®</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SUPERSTART® products are yeast nutrients for use at the active dry yeast rehydration step. Use ensures optimal aromatic performance and a healthy and complete fermentation (contains inactivated yeast, autolysates). Patent FR 2736651. These products:

- Used during yeast hydration will provide essential elements of the yeast membrane (long-chain fatty acids and ergosterol) to ensure membrane fluidity, alcohol tolerance and high efficiency of sugar and nutrient transporters until the last yeast generation.
- **Significantly reduce** production of VA and H₂S.
- Promote onset of MLF (the yeast will produce fewer compounds inhibiting malolactic bacteria due to a less stressful primary fermentation.
- In nitrogen deficient juice and must, an additional supply of ammonium salts or organic nitrogen (i.e. NUTRISTART® AROM or NUTRISTART®) remains essential.
- To be used in the cases of high potential alcohol, low turbidity white juice, low fermentation temperature or yeast restart cultures.
- To be added into yeast rehydration water.

Dosage: 20 - 30 g/hL (increase the dosage for potentially high alcohol juice and must).

OMRI: Listed for use in organic winemaking.

**SUPERSTART® Rouge**

Due to its high ergosterol content, SUPERSTART® ROUGE improves yeast cell longevity under stressful conditions and increases yeast tolerance to high temperatures and alcohol.

**SUPERSTART® Blanc** (white and rosé wines)

Due to its specific formulation, particularly rich in certain vitamins and mineral salts, SUPERSTART® BLANC optimises the production and aromatic revelation by yeasts, producing more aromatic wines while also guaranteeing stronger fermentation completion.
**NUTRISTART® AROM**
Complete nutrient (inactivated yeast, yeast cell fragments rich in glutathione and diammonium phosphate) enhancing the aromatic complexity of wines.

- Balance between nitrogen sources (organic and mineral) highlighting wine organoleptic complexity.
- Glutathione-rich formula useful during vinification of white and rosé wines to preserve the aromatic potential of wines.
- 10 g/hL of NUTRISTART® AROM brings the equivalent of 14 mg/L of assimilable nitrogen.

Dosage: 20 - 60 g/hL depending on nitrogen deficiency levels.
To be added to the tank in 1 or several steps, during the first third of alcoholic fermentation.

---

**NUTRISTART® ORG**
100% organic nutrient from inactivated yeast (yeast autolysates), rich in amino acids, vitamins (thiamine, niacin, pantothenic acid, folic acid…), minerals and micro-nutrients (magnesium, manganese, zinc…) favouring cell multiplication.

- Ensures regular and complete alcoholic fermentation in the case of slight to moderate nutritional deficiencies.
- Restricts the formation of undesirable compounds (combining compounds, negative sulphur compounds such as H₂S, SO₂, etc.).
- Organic nutrition yields the most aromatic wines.
- In the case of large nitrogen deficiencies and/or high potential alcohol, use NUTRISTART® ORG with a supplementary nitrogen source to guarantee improved nutritional balance in the yeast.
- 10 g/hL of NUTRISTART® ORG brings the equivalent of 10 mg/L of assimilable nitrogen.

Dosage: 30 - 60 g/hL according to the necessary nitrogen addition.
To be added to the tank in 1 or several steps, during the first third of alcoholic fermentation.

---

**NUTRISTART®**
All-round yeast activator combining growth and survival factors and promoting yeast multiplication (inactivated yeast, yeast autolysates, diammonium phosphate and thiamine).

- To be used in the case of nutrient deficiency in the must.
- 10 g/hL provides about 15 mg/L assimilable nitrogen.

Dosage: 20 - 45 g/hL. Dosage should be based on the initial assimilable nitrogen content.
To be added to the tank in 1 or several steps, during the first third of alcoholic fermentation.

---

**AVAILABLE NITROGEN FOR 10 g/hL**

<table>
<thead>
<tr>
<th>NUTRISTART® ORG</th>
<th>NUTRISTART® AROM</th>
<th>NUTRISTART®</th>
<th>THIAZOTE®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic available nitrogen</td>
<td>****</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Mineral available nitrogen</td>
<td>**</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Vitamins and minerals</td>
<td>****</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Nutritional balance</td>
<td>***</td>
<td>****</td>
<td>**</td>
</tr>
</tbody>
</table>
# YEAST AND BACTERIA NUTRITION

The best for your yeast and your bacteria

## YEAST NUTRITION - OTHERS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIAZOTE®</td>
<td>Alcoholic fermentation activator (ammonium salts and thiamine). 10 g/hL of THIAZOTE® provides 21 mg/L assimilable nitrogen.</td>
<td>To be determined according to fermentation conditions (Initial YAN, probable alcohol...).</td>
<td>1 kg 5 kg 25 kg</td>
</tr>
<tr>
<td>THIAZOTE® SP</td>
<td>Alcoholic fermentation activator (blend of ammonium phosphate, ammonium sulfate and thiamine). 10 g/hL of THIAZOTE® SP provides 21 mg/L assimilable nitrogen.</td>
<td>To be determined according to fermentation conditions (Initial YAN, probable alcohol...).</td>
<td>1 kg 5 kg 25 kg</td>
</tr>
<tr>
<td>THIAZOTE® PH</td>
<td>Alcoholic fermentation activator (diammonium phosphate and thiamine). Suitable for organic according to Commission Regulation (EC) No. 889/2008. 10 g/hL of THIAZOTE® PH provides 21 mg/L assimilable nitrogen.</td>
<td>To be determined according to fermentation conditions (Initial YAN, probable alcohol...).</td>
<td>1 kg 5 kg 25 kg</td>
</tr>
<tr>
<td>BI-ACTIV®</td>
<td>A formulation of survival factors to be used when fermentation slows down or becomes stuck. Does not contain DAP (yeast cell walls, inactivated yeast, inert supporting elements).</td>
<td>30 - 60 g/hL</td>
<td>1 kg</td>
</tr>
<tr>
<td>OENOCELL®</td>
<td>Highly purified yeast cell walls to stimulate and activate alcoholic fermentation (yeast cell walls).</td>
<td>20 - 40 g/hL, depending on the type of treatment.</td>
<td>1 kg</td>
</tr>
<tr>
<td>OENOCELL® BIO</td>
<td>Yeast cell walls certified organic according to organic production methods in European regulations (EC) No. 834/2007 and (EC) No. 889/2008 and their amendments, and complies with American regulations (NOP) on organic production.</td>
<td>20 - 40 g/hL, depending on the type of treatment.</td>
<td>1 kg</td>
</tr>
<tr>
<td>TURBICEL®</td>
<td>Cellulose powder for over-clarified juice. 10 g/hL increases the juice/must turbidity by 20 NTU.</td>
<td>20 - 50 g/hL, depending on the turbidity correction to be made.</td>
<td>5 kg</td>
</tr>
</tbody>
</table>

## BACTERIA NUTRITION

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERGIZER®</td>
<td>A preparation designed specifically to boost bacterial resistance during malolactic fermentation (inactivated yeast).</td>
<td>5 g/hL</td>
<td>250 g 1,25 kg</td>
</tr>
<tr>
<td>MALOSTART®</td>
<td>Yeast activator facilitating malolactic fermentation (MLF) onset, restart, and accelerating fermentation kinetics (inactivated yeasts, yeast cell wall).</td>
<td>30 g/hL</td>
<td>1 kg</td>
</tr>
</tbody>
</table>

Find out more: See our video YEAST NUTRITION on our website, at LAFFORT & YOU.
THE DEMAND FOR YEAST NITROGEN

The nitrogen sources that can be used by *Saccharomyces cerevisiae* are ammonium (NH$_4^+$) and amino acids (organic nitrogen). They both represent assimilable nitrogen and are present in must at varying concentrations, sometimes not in sufficient quantities to meet the requirements of the yeast.

The three following factors must be taken into consideration:

- **Below 150 mg N/L, must is deficient.** It is therefore important to supplement it with nitrogen elements.

- **Yeast nitrogen requirements depend on sugar concentration.** The higher this concentration, the greater the amount of yeast biomass needed to successfully achieve a thorough breakdown of the sugars during alcoholic fermentation. Although, the yeast biomass must not be too excessive to avoid an induced nitrogen deficiency.

- **The nitrogen initially present in must is rapidly assimilated** during the first third of the alcoholic fermentation (d-30), at the point when the biomass is at its highest density. Consequently, irrespective of the initial nitrogen content, its addition during alcoholic fermentation (d-30) allows to preserve the biomass formed, which is dependent on the yeast strain and proportional to the initial nitrogen concentration.

**FOCUS // YEAST NUTRITION**

**DID YOU KNOW?**

The key enzyme in the production of H$_2$S is sulphate reductase. When the H$_2$S and amino acids pathways meet, the sulphur amino acids (cysteine and methionine) are produced. Where there is an imbalance between these two pathways and a nitrogen deficiency, the precursors of these sulphur amino acids are limiting, leading to an accumulation of H$_2$S.
WHY ORGANIC NUTRITION?

Organic nitrogen is supplied by adding yeast derivatives (usually autolysed yeast). In addition to amino acids, these yeast derivatives include lipids, vitamins and minerals which also contribute to the efficient performance of the yeast. Yeast has the ability to simultaneously assimilate organic nitrogen and mineral nitrogen from the beginning of the alcoholic fermentation. Organic nitrogen must be present in order to:

- Limit the production of SO₂ and sulphur compounds (H₂S and mercaptans).
- Produce healthy, but not excessive, biomass.
- Limit the risk of stuck or sluggish fermentation.

Yeast has the ability to simultaneously assimilate organic nitrogen and mineral nitrogen from the beginning of the alcoholic fermentation. Organic nitrogen must be present in order to:

- Limit the production of SO₂ and sulphur compounds (H₂S and mercaptans).
- Produce healthy, but not excessive, biomass.
- Limit the risk of stuck or sluggish fermentation.

ORGANOLEPTIC EFFECTS OF ORGANIC NUTRITION

Numerous experiments show that improved outcomes of alcoholic fermentation can be achieved with the use of organic nitrogen. Even in the case of wines considered dry (glucose + fructose < 2 g/L), small amounts of fermentable sugars can be used by degrading microorganisms and can have an adverse effect on the quality of the wines (Figure 2).

Besides its effects on fermentation kinetics, the addition of organic nitrogen can increase the fruitiness of wines and limit the aromatic mask linked to the production of sulphur compounds during the alcoholic fermentation. Except for the source of the nitrogen added, a comparison of wines produced under the same conditions reveals significant preferences for wines derived from musts supplemented with NUTRISTART® ORG (table 1). The wines are considered fruitier, fresher, less vegetal and subject to less reduction than those supplemented with mineral nitrogen alone.
POWERLEES® Rouge
Formula based on inactivated yeast and β-glucanase, for fining during fermentation.
Fruit of our LAFFORT® R&D, POWERLEES® Rouge carries inherent cell components that soften the from since the beginning of the alcoholic fermentation.

• The enzyme action accelerates the organoleptic fining.
• Extraction of components with high sensory potential (sapid peptides from Hsp12 protein): β-glucanase helps the fast extraction of peptides present at the cell envelopes of the inactivated yeast and from yeast autolysis fragments.
• Contributes to wine stabilisation through fining and the diffusion of mannoprotein fragments from yeast.
• Allows the winemaker to rebuild lees in wines racked after fermentation.
• Specialy adapted to high-speed marketed wines.

Dosage: 15 - 40 g/hL.

Fermentation under synthetic media at 25°C.
Inoculation with ZYMAFLORE® XPURE at 20 g/hL. Hsp12 measurement via HPLC, C18.
Additions at the begining of alcoholic fermentation.

POWERLEES® Rouge allows, from the end of AF, efficient liberation of bigger fractions Hsp12 sapid peptides.
Finishing / Polishing

**OENOLEES®** is an oenological product derived from natural constituents found in wine and obtained using innovative and patented production processes. It is paving the way for a new type of oenology: more natural, more specific while enhancing and preserving the integrity of wine.

**OENOLEES®**
Specific preparation of yeast cell walls with a high sapid peptide content for premium red wine fining (Patent EP 1850682) (Yeast cell walls, inactivated yeasts).

OENOLEES®, the result of LAFFORT®’s research on the properties of yeast lees and their importance in wine, contributes towards improving organoleptic quality in wine by:

- **Reducing aggressive sensations:** the cellular envelopes have a refining action that promotes elimination of certain polyphenols responsible for bitterness and astringency.
- **Increasing sweet sensations:** OENOLEES® has a high content of a specific peptide fraction that is released naturally by yeasts during autolysis and has an excessively low perception threshold (only 16 mg/L compared to 3 g/L for sucrose).

Dosage: 20 - 40 g/hL.
OMRI: Listed for use in organic winemaking.

Aromatic Preservation

**FRESHAROM®**
Specific preparation of inactivated yeasts with a high antioxidant capacity.

- **Rich in glutathione and reductive metabolites,** glutathione has a significantly higher antioxidant potential than SO₂ or ascorbic acid.
- **Enables the yeast to assimilate glutathione precursors** (cysteine, N-acetylcysteine…) during alcoholic fermentation and thus synthesise more of this tripeptide.
- **Efficiently protects the wine’s aromatic potential and significantly delays the appearance of oxidised notes.**
- **Obtains more aromatic wines with improved ageing potential.**

Dosage: 20 - 30 g/hL.

Incorporate to the tank during the first 1/3 of alcoholic fermentation.

Comparison of relative protective power of different products on the market rich in glutathione and its precursors.
What are the different techniques of bacteria addition?
Fermentation management typically involves the addition of yeasts, then the addition of bacteria for malolactic fermentation (MLF) following the completion of alcoholic fermentation (AF). More and more winemakers are choosing yeast/bacteria co-inoculation, where bacteria are added before the primary fermentation is complete.

There are different techniques. Early co-inoculation is when bacteria are added 24 hours after the beginning of AF. The main goal is to optimise the bacterial acclimatisation and survival (close to 100% after inoculation) and to save time. Bacteria can also be added to the wine towards the end of AF, at about 3° Brix, in case of a late co-inoculation. The main goal of this technique is to prevent microbial alteration: selected bacteria will take over after yeast, and dominate the ecosystem avoiding spoilage micro-organism growth (Brettanomyces yeasts, biogenic amine-producing bacteria, etc.). These two co-inoculation techniques are also economically significant: the total energy costs are greatly reduced, since bacteria are added to a warm wine and MLF is faster. In addition, both techniques facilitate quick completion of the MLF, allowing the wine to be stabilised as soon as possible.

What are the key points and how to perform a co-inoculation?
SO₂ management on the grapes, pH, yeast strain and nutrition, maceration and fermentation temperature, bacteria strain and inoculation are extremely important factors. The alcoholic fermentation has to be steady until completion to make sure the bacteria population will not develop towards an aerobic metabolism (sugar consumption). In case of co-inoculation, LAFFORT® recommends the LACTOENOS® SB3 DIRECT, B7 DIRECT or 450 PREAC® bacteria, depending on your wine conditions. Ask your LAFFORT® representative for the specific co-inoculation protocol.

After completion of the alcoholic fermentation, malolactic fermentation is an excellent tool to limit the production of compounds that combine with SO₂ in the wine.
The bacteria are able to decompose compounds formed during the alcoholic fermentation that combine with SO₂. Thus, if started as soon as the AF is complete and carried out quickly, MLF provides a reduction in the wine's SO₂ combination rate, which is directly proportional to the length of the MLF (see figure below).

The rate of combination of wine after MLF

Source: Coulon J. & al, RDO No. 151, April 2014, p.44-46. Sulfitage management

How to maximise the impact of SO₂ while controlling its intake.

* CL35: dose of total SO₂ required to obtain 35 mg/L free SO₂. The higher the value, the higher the content of SO₂ binding components in the wine.
The fatty acids produced by yeast in stress conditions also perform the function of inhibitors during activation of malolactic fermentation. In instances of problematic or sluggish alcoholic fermentation, it is advisable to process with yeast cell wall (OENOCELL®) to reduce fatty acid load and promote MLF.

NB: over 25°C, the viability of lactic bacteria is affected.

### Choosing the right type of inoculation

<table>
<thead>
<tr>
<th>INOCULATION TYPE</th>
<th>STAGE</th>
<th>RECOMMENDED LACTOENOS® PREPARATION</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Co-inoculation*</td>
<td>24 to 48 hours after the start of alcoholic fermentation.</td>
<td>LACTOENOS® B7 Direct LACTOENOS® SB3 Direct LACTOENOS® 450 PreAc</td>
<td>Save time and prevent degradation. Optimise management of the fermentation processes. Reduce the production of diacetyl.</td>
</tr>
<tr>
<td>Late Co-inoculation</td>
<td>At 1,7° Baume.</td>
<td>LACTOENOS® SB3 Direct LACTOENOS® B7 Direct LACTOENOS® 450 PreAc</td>
<td>Monopolistic control of the ecosystem. Safeguarding a conventional vinification sequence (AF followed by MLF).</td>
</tr>
<tr>
<td>Sequential Inoculation</td>
<td>At dryness and post pressing.</td>
<td>LACTOENOS® SB3 Direct LACTOENOS® B7 Direct LACTOENOS® 450 PreAc</td>
<td>Red wine MLF post pressing. MLF in barrel. Thermo-vinification. Reduce the potential of SO2 to combine with wine.</td>
</tr>
<tr>
<td>Curative Inoculation</td>
<td>To restart a stuck MLF.</td>
<td>LACTOENOS® B16 Standard LACTOENOS® B7 Direct LACTOENOS® 450 PreAc</td>
<td>Restarting stuck MLF. Spring MLF.</td>
</tr>
</tbody>
</table>

* During the first few days of AF, must pH drops to 0.2 units. This parameter is to be taken into account when selecting the strain. Do not hesitate to contact your LAFFORT® representative to check on the inoculation time and quantity to incorporate.

### Strain specifications

<table>
<thead>
<tr>
<th>PREPARATION</th>
<th>ALCOHOL</th>
<th>pH</th>
<th>SO₂, TOTAL</th>
<th>TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LACTOENOS® B7 DIRECT</td>
<td>≤ 16 % vol.</td>
<td>≥ 3,2</td>
<td>≤ 60 mg/L</td>
<td>≥ 16°C</td>
</tr>
<tr>
<td>LACTOENOS® SB3® DIRECT</td>
<td>≤ 15 % vol.</td>
<td>≥ 3,3</td>
<td>≤ 40 mg/L</td>
<td>≥ 18°C</td>
</tr>
<tr>
<td>LACTOENOS® 450 PREAC</td>
<td>≤ 17 % vol.</td>
<td>≥ 3,3</td>
<td>≤ 60 mg/L</td>
<td>≥ 16°C</td>
</tr>
<tr>
<td>LACTOENOS® B16 STANDARD</td>
<td>≤ 16 % vol.</td>
<td>≥ 2,9</td>
<td>≤ 60 mg/L</td>
<td>≥ 16°C</td>
</tr>
</tbody>
</table>

The fatty acids produced by yeast in stress conditions also perform the function of inhibitors during activation of malolactic fermentation. In instances of problematic or sluggish alcoholic fermentation, it is advisable to process with yeast cell wall (OENOCELL®) to reduce fatty acid load and promote MLF.

NB: over 25°C, the viability of lactic bacteria is affected.
**LACTOENOS® B7 DIRECT**

*Direct inoculation bacteria.*

- A strain that performs reliably in wide-ranging conditions of pH, alcohol, SO₂, temperature and tannic structure, in red, white and rosé wines.
- The direct process allows inoculation of *LACTOENOS® B7 DIRECT* directly into the wine.
- With well-managed MLF the fruitiness of the wine can be retained (low VA, no biogenic amines or diacetyl) and the combination rate in the wine (ethanol and other molecules combining SO₂) can be minimised, to achieve an increase in active SO₂.
- *LACTOENOS® B7 DIRECT* is particularly suitable for co-inoculation on must with a pH of > 3.4 (during the first few days of AF, the pH can drop to 0.20 units).

Dosage: refer to the packaging.

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**LACTOENOS® SB3 DIRECT**

*Direct inoculation bacteria.*

- The direct process allows inoculation of *LACTOENOS® SB3 DIRECT* directly into wines.
- In association with good fermentation management and correct yeast nutrition, *LACTOENOS® SB3 DIRECT* can be inoculated at the start of alcoholic fermentation (early co-inoculation) and ensures rapid MLF immediately afterwards.

Dosage: refer to packaging.

---

**LACTOENOS® 450 PREAC**

*A pre-acclimatised bacteria distinguished by its high malolactic activity.*

- Strong implantation capacity in wines at any stage of its inoculation in wine or must (pH, fatty acids...).
- Especially selected for its resistance to high alcohol (up to 17% v/v).
- An exclusive production process, developed by *LAFORT®,* that ensures a higher bacterial survival rate and a shortened latency phase. *ENERGIZER®* starter supplied with the bacterium.

Dosage: refer to packaging.

---

**LACTOENOS® B16 STANDARD KIT**

*Bacterium and reactivator kit.*

- Very resistant strain particularly suited for restarting MLF due to its precise protocol of acclimatisation.
- The adaptation is made by pied de cuve (multiple step protocol, 3 to 5 days duration, please refer to package label or product data sheet). The activator is supplied with the bacterium.

Dosage: refer to packaging.

---

**Practical Advice**

In instances where the wine displays limiting characteristics (low pH, high level of clarification, high AT or SO₂ levels, nutritional deficiencies, problematic AF...), the addition of an MLF nutrient is essential for the activation and progress of MLF.

*MALOSTART® & ENERGIZER®,* nutrient specific for bacteria: see page 19.
LACTOENOS® BACTERIA
Managing MLF differently

FIND OUT MORE: Discover our MALOLACTIC FERMENTATION RESTART PROTOCOL on our website, at LAFFORT & YOU.
Although enzymes are naturally occurring in grape berries and wine microorganisms, they are found in varying concentrations. Their addition into a winemaking process to promote grape must clarification or extraction dates back to the 1970’s. Nowadays, LAFAZYM® and LAFASE® enzymes have become essential in many oenological applications. Not only do they facilitate the pressing, clarification and filtration steps, they also allow for aroma expression, improve taste perception, colour and structure of the wines... Mastering enzyme use will allow to reduce the use of other ingredients or processing aids.

**Enzymology and biochemistry: behind the scenes of enzyme formulation.**

Enzymes are highly-specific complex catalytic proteins. In the wine industry, the most common principal activities are the pectinases (polygalacturonase [PG], pectin methyl esterase [PME], pectin lyase [PL], arabinanase, rhamnogalacturonase and galactanase). In addition, there are some glucanases and glycosidases complemented with many naturally occurring side activities such as hemicellulases, cellulases, proteases. Winemaking enzymes, except for LYSOZYME which is extracted from egg white, are produced in fermentors by microorganisms that belong, as do yeast, to the fungus family. The precise selection of the production strain and the unique composition of the growing medium induces optimal concentration of the targeted principal enzymatic activities accompanied with numerous side activities. Of the side activities naturally produced, some are essential, and play a capital role in product performances, other are potentially detrimental to the wine.

**LAFASE® et LAFAZYM® guarantees.**

LAFFORT® enzymes comply with international enological specifications. A compliance list is available for use in organic wine production. Each product contains the enzymatic activities required for best results in wine or juice. With organoleptic qualities respect and optimum performances in mind, some of our enzymes undergo a unique purification process to remove any potentially detrimental activity such as:

- Cinnamoyl esterase activity (formerly Cinnamoyl Esterase or depsidase): an enzymatic activity that entersin the production of vinyl phenols (pharmaceutical or paint like smells).
- Anthocyanase, a side activity that causes colour loss.

**Purified enzymes are identified by this logo in our catalog.**

**Why different forms?**

- **Microgranulate** offers easy room temperature storage and best stability. Their activity remains stable and are at no risk of microbial contamination even after opening.

- **Liquid enzymes** are the most convenient to handle and dose but require cold storage. These enzymes require to be diluted for even repartition into grape must and wines. They should be stored in a cool place they have a shorter shelf life as their micro biological stability is harder to guarantee.
## ENZYMES

### Natural accelerators

<table>
<thead>
<tr>
<th>Form</th>
<th>LAFASE HE GRAND CRU</th>
<th>LAFASE FRUIT</th>
<th>LAFAZYM CL</th>
<th>LAFAZYM PRESS</th>
<th>LAFAZYM EXTRACT</th>
<th>OPTIZYM</th>
<th>LAFAZYM AROM</th>
<th>LAFAZYM THIOLS</th>
<th>LAFASE 600XL</th>
<th>LAFASE THERMO LIQUIDE</th>
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<tbody>
<tr>
<td>FCE Purified preparation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>**</td>
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<tr>
<td>Enhances the thiols revelation in wines***</td>
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<tr>
<td>Clarification of white and rosé musts</td>
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<td>Clarification at low temperature (≤ 5°C)</td>
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<tr>
<td>Clarification of red grape musts treated by thermo-vinification</td>
<td>●</td>
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</tr>
<tr>
<td>Clarification of wines (free-run and/or press)</td>
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<tr>
<td>Lees ageing</td>
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<tr>
<td>Filtration and/or botrytised harvests</td>
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<tr>
<td>Aromas release</td>
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</tr>
</tbody>
</table>

✓ = Purified in order to optimise the required actions.

* CE is inhibited by 3% ethanol; purified preparations are not necessary during use of these enzymes.

** Enzymes produced by means of technology maintain unwanted activity at non-significant levels.

*** Acts in synergy with specialty yeast with thiol production abilities (ZYMAFLORE® X5, DELTA, VL3…).

### Legend

- ○ Microgranulate
- ● Liquid
- ● Red
- ● White
- ● Rosé
**LAFASE® HE GRAND CRU**

- Designed for traditional macerations. Produces structured wines rich in colour and elegant tannins.
  - Microgranulated preparation of pectolytic enzymes with secondary activities.
  - Purified from CE to help preserve aromatic finesse of wines.
  - Increases wine ageing ability by promoting the extraction of stable phenolic compounds and polysaccharides.
  - Increases the sensation of sweetness and decreases the astringency in wines by the targeted extraction of smaller size polysaccharides (RGII) and less larger size polysaccharides (PRAG).
  - Increases free run wine yield.
  - Eases wine clarification.

Dosage: 3 - 5 g/100 kg of grapes.

**LAFASE® FRUIT**

- Designed for short macerations with or without cold and/or pre-fermentation cold soaking.
  - Microgranulated preparation of pectolytic enzymes rich in secondary activities.
  - Purified from CE to help preserve aromatic finesse of wines.
  - Optimises the fruit potential of wines by promoting gentle extraction of phenolic compounds and aromas from the grape skin while minimizing the need for mechanical actions.
  - Increases free run wine yield.
  - Eases wine clarification.

Dosage: 3 - 5 g/ton.

**LAFASE® XL Extraction**

- Designed for maceration of red and white grapes to optimise quality juice volumes.
  - Liquid pectolytic enzymes with secondary activities.
  - Increases free run juice or wine yields.
  - Improves grape skin compound release.
  - Limits mechanical actions.
  - Eases juice and wine clarification.

Dosage: 2 - 4 mL/100 kg of grapes.

**LAFASE® THERMO LIQUIDE**

- Designed for thermo-treated juices to promote better clarification and pressing.
  - Liquid pectolytic enzymes with secondary activities.
  - Quick and efficient depectinisation over a large spectrum of temperatures (<65°C).
  - Eases pressing and increases pressing yields.
  - Decreases viscosity of musts.

Dosage: 3 - 5 mL/100 kg of grapes.
RED PRESS WINE
Natural accelerators

For best treatment efficiency, add the enzymes as early as possible, in fermentation when possible or at the press pan.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRALYSE®</td>
<td>Microgranulated preparation of pectolytic enzymes rich in β-(1-3 ; 1-6) glucanase. Enhances clarification and filtration of wines.</td>
<td>10 - 15 g/hL</td>
<td>250 g</td>
</tr>
<tr>
<td>LAFAZYM® CL</td>
<td>Microgranulated preparation of pectolytic enzymes for clarification. Improves clarification, reduces lees volume, improves lees settling and compaction.</td>
<td>2 - 4 g/hL</td>
<td>100 g 500 g</td>
</tr>
<tr>
<td>LAFAZYM® 600 XLICE</td>
<td>Highly concentrated liquid pectolytic enzymes preparation for rapid clarification of wines on a wide range of pH and temperature.</td>
<td>1 - 3 mL/hL</td>
<td>0,3 kg 12 kg</td>
</tr>
<tr>
<td>LAFASE® XL CLARIFICATION</td>
<td>Liquid preparation of pectolytic enzymes for clarification.</td>
<td>0,5 - 5 mL/hL</td>
<td>1.19 kg 11.9 kg</td>
</tr>
</tbody>
</table>

FOCUS // ON THE TREATMENT OF RED PRESS WINES

Red press wines contain very high level of solids, they contain many macromolecules that hinder clarification before blending and bottling. These large molecules, mainly polysaccharides, origin from grapes (homogalacturonans, rhamno galacturonans RGI and RGII, PRAGS...), fermentation yeasts or contaminating fungi such as Botrytis cinerea (mannoproteins and glucan). The interaction of these molecules with other wine components causes haze and impede sedimentation in a more or less permanent manner.

Enzymatic preparations allow efficient clarification and facilitate filtration of press wines. The benefits of a well conducted enzyme addition are proven both from a technical stand point (lower filter clogging index, optimum sedimentation, reduced turbidity and more compact lees), as well as from a quality stand point (reduced oxidation, aroma protection) or even an economic stand point (labor and time management...).

Several concentrated pectinase preparations with targeted secondary activities as well as enzymatic preparations containing β-glucanases can be recommended depending on the particles and interactions responsible for the haze. Dose, temperature and contact time are of course interdependent criteria to be taken into account to achieve targeted yields.
**LAFAZYM® EXTRACT**
*Designed for pre-ferment skin contact at low temperatures.*

- Microgranulated preparation of pectolytic enzymes with secondary activities.
- Helps reduce maceration duration.
- Allows for varietal aroma and precursor extraction, increases the aromatic potentials of must.
- Purified from CE to help preserve aromatic finesse of wines.
- Improves drain or free run juices yields and clarification.

Dosage: 2 - 3 g/ton.

---

**LAFAZYM® PRESS**
*Designed for pressing red and white grapes to optimise quality juice volumes in white and rosé wines production.*

- Purified microgranulated preparation of pectolytic enzymes rich in secondary activities.
- Purified from CE; low PME in order to preserve aromatic finesse.
- Improves free run juice and first pressing yields (white and rosé).
- Decreases the duration length and number of pressing cycles.
- Improves juice clarification and filterability.

Dosage: 2 - 5 g/ton.

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**LAFASE® XL PRESS**
*Designed for pressing red and white grapes to optimise quality juice volumes in white and rosé wines production.*

- Purified liquid preparation of pectolytic enzymes with secondary activities.
- Increases high-quality juice yields.
- Protects musts from oxidation.
- Shortens pressing cycles, and prevents over-maceration by limiting mechanical actions.

Dosage: 1 - 4 mL/ton.

---

**Volatile thiols analysed**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Concentration (in ng/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3SH</td>
<td></td>
</tr>
<tr>
<td>4MSP</td>
<td></td>
</tr>
</tbody>
</table>

The use of **LAFAZYM® PRESS**, compared to no enzyme allowed not only a significant process time saving, an increase in quality free run juice, and a decrease in lower quality press juice yield.
LAFAZYM® CL
Designed for juice clarification maximising grape potential with respect for terroir of juice for the production of superior white wines.
• Microgranulated preparation of pectolytic enzymes rich in secondary activities.
• Improves lees settling and compaction.
• Increases the volume of clear juice.
• Purified from CE to help preserve aromatic finesse of wines.
Must dosage: 0.5 - 2 g/hL.

LAFAZYM® 600 XL ICE
Designed for enhanced clarification of grape must and wines on a wide spectrum of pH and temperature for the production of superior wines.
• Liquid pectolytic enzymes with secondary activities.
• Allows for fast depectinisation even at very low temperature (as low as 5°C).
• Reduces depectinisation time and improves lees compaction.
• Purified from CE to help preserve aromatic finesse of wines.
Dosage: 0.5 – 2 mL/hL.

LAFASE® XL
Designed for enhanced clarification of grape must and wines.
• Liquid pectolytic enzymes with secondary activities.
• Well adapted for fast depectinisation prior to flotation.
• Allows the clarification of must from heat treatment or flash deentente.
Dosage: 0.5 - 3 mL/hL.

We strongly recommend to conduct a pectin test in order to verify complete depectinisation before proceeding to fermentation. It is now established that insufficient depectinisation will result in post-fermentation filtration problems. In the presence of alcohol, the macromolecules of pectin like those of glucan, are becoming more condensed, they are said to become “globular”. In an alcoholic environment, their enzymatic hydrolysis becomes extremely slow, if not impossible. It is thus essential to ensure complete pectin degradation before alcoholic fermentation.
To evaluate the presence of pectin, consider using our pectin test. A protocol is available on our website www.laffort.com.
**FOCUS // DIFFICULT CLARIFICATIONS**

Under certain oenological conditions, depectinisation and clarification of white and rosés can be problematic (low temperatures <8°C), low pH, low maturity, grape varieties with highly branched pectins... These difficult conditions, often add up and can be aggravated by winery time constraints.

**WHAT IS A ROBUST ENZYME?**

The robustness of an enzyme preparation is its resistance to disturbances in the conditions of the environment. This property is crucial for the preparation to maintain its performance under varying conditions of pH and temperature or alcohol levels.

**USING ROBUST ENZYMES – ENZYMES THAT WITHSTAND HARSH CONDITIONS:**

Laboratory application tests have confirmed that our clarifying enzymes, in particular LAFAZYM® CL and LAFAZYM® 600 XLICE are the most robust* commercially available enzymes. They offer reliable performance within a wide range of physicochemical conditions.

**Flotation Enzyme:** liquid enzyme for the clarification of musts before flotation.

**Cold Enzyme:** enzyme for the clarification at low temperature.

**Extreme Enzyme:** enzyme that is effective under extreme temperature and maturity conditions.

The optimised formulation of LAFAZYM® 600 XLICE optimises its robustness. This results in increased performance of the preparation at low temperatures as well as reduced time required for depectinisation (negative pectin test).

**Benchmark trial with LAFAZYM® 600 XLICE.** Static settling, enhanced lees compaction and juice clarification overnight at 5°C (Trial in 500 mL tubes).
USE OF A PECTINASE BOOSTER:

LAFASE® BOOST

LAFASE® BOOST offers a unique and innovative approach to work within modern winemaking constraints: complex pectin, limited time (case of flotation), less robust enzyme preparations (intolerance to low temperatures and pH variations) diluted or mono activity pectinases (low levels of essential secondary activities as it is the case for pectinases originating from self cloned or GM microorganisms)... LAFASE® BOOST removes the side chains of the pectin molecule, thus optimising the hydrolysing power and performance of any common clarification pectinase.

OBJECTIVE AND RESULTS

Synergetic action of LAFASE® BOOST with common clarification pectinases:
• Complete depectinisation.
• Rapid depectinisation to allow to work with the winery pre-planned juice flow and tank occupation.
• Lowering turbidity when necessary with an increased proportion of clear juice after flotation.

Enhancing the usual pectinase performances by addition of LAFASE® BOOST. Chardonnay - Lodi, California 3 h after enzyme addition – winery temperature.

MODALITY A:
Usual pectinase - 2 mL/hL.

MODALITY B:
Usual pectinase 2 mL/hL + LAFASE® BOOST 1 mL/hL.

Improving depectinisation speed on Sauvignon Blanc - Stellenbosh, South Africa.

Only the LAFASE® BOOST treated modalities reached a negative pectin test in less than 3 hours. It is interesting to note that after 4 hours 1 mL/hL LAFASE® XL CLARIFICATION was as efficient as 3 mL/hL of the winery usual pectinase. On this complex Sauvignon must only supplementing with LAFASE® BOOST allowed to complete depectinisation in the timing constraint imposed by the winery for optimum juice flow and tank occupation.
LAFAZYM® THIOLS
Specific for bringing out aroma in grape varieties with volatile thiol characters.
- Microgranulated preparation of pectolytic enzymes with secondary activities.
- Acts in synergy with thiol specific specialty yeast.
- Increases wines aromatic intensity.
Dosage: 3 - 6 g/hL.

EXTRALYSE®
Designed for enhanced clarification and filtration of wines, allows for enhanced mouthfeel and perceived sweetness.
- Microgranulated preparation of pectolytic enzymes rich in β-(1-3 ; 1-6) glucanase.
- Releases molecule responsible for roundness and volume on the palate derived from ageing on lees.
- For optimum performances we recommend adding a primary dose of EXTRALYSE® during alcoholic fermentation.
- Improves wines filterability and clarification especially in the case of wines affected by Botrytis cinerea.
Dosage: 6 - 10 g/hL.

LAFASE® BOOST
Designed to complement usual pectinases in essential side activities to unlock or accelerate depectinisation.
- Liquid preparation of pectolytic enzymes rich in essential side activities.
- Acts in synergy with usual clarification pectinases to allow timely and complete depectinisation.
- Allows to decrease the time necessary to obtain a negative pectin test and fit into winery time constraints.
- Allows lighter juices and more compact lees.
Dosage: 1 - 1,5 mL/hL (in addition to the manufacturer recommended dose of usual pectinase).

LAFAZYM® AROM
Specific to aromatic wines from grapes such as Riesling, Gewürztraminer, Chenin, Grenache, Syrah...
- Microgranulated preparation of pectolytic and β- glycosidases enzymes.
- Improves the aromatic intensity of wines from grapes with glycosylated precursors (terpenes, norisoprenoids…).
- Use preferably after alcoholic fermentation on finished wines or base wines for sparkling wines.
Dosage: 2 - 4 g/hL.

LYSOZYM
Designed for microbial management of Gram positive bacteria.
- Microgranulated muramidase enzyme activity.
- Degrades Gram+ lactic acid bacteria cell wall.
- Delays the action of lactic bacteria reducing total SO₂ requirement.
- Reinforces SO₂ action on sweet white wines and increases the microbiological stability.
- In red winemaking, prevents early malolactic fermentation onset (in the case of a sluggish or stuck fermentation or in the case of micro-oxygenation).
- Limits the competition between yeast and bacteria.
Dosage: 10 - 50 g/hL.
A UNIQUE enzyme formulation of pectinases and β-(1-3; 1-6) glucanases with secondary activity. Allows for optimisation and acceleration of winemaking and ageing processes.

**ACCELERATES YEAST AUTOLYSIS:**

Ageing on lees is an enzymatic degradation of yeast cell compartments (commonly known as “yeast autolysis”) leading to cell-wall degradation. This process results in a reduction in the molecular weight of soluble or insoluble compounds such as glucans, proteins, polypeptides, mannoproteins and polysaccharides. These smaller-sized subunits can be diffused and improve the structure, texture and stability of the wine.

This study shows that the specific enzymatic formulation EXTRALYSE® accelerates yeast autolysis by favouring the release of a larger quantity of molecules of interest, while also improving wine filterability and clarification.

This study allowed the isolation of three peptide fractions; the smallest sized (0.5 to 3 KDa) gave the wines an impression of sweetness, detectable after ageing on lees. The use of EXTRALYSE® at 5 g/hL allowed the release of twice the quantity of this fraction compared to a control without enzyme (see table).

**Figure 1:** Monitoring yeast autolysis by measuring the concentration of nitrogen compounds released in a model medium (in mg/L leucine equivalents) with and without EXTRALYSE® 5 g/hL. Experimental design: alcoholic fermentation of a synthetic must with the yeast Saccharomyces cerevisiae 522 D.

**Table 1:** Peptide fractions during yeast autolysis - 154 days.

<table>
<thead>
<tr>
<th>Procedures compared</th>
<th>Molecular fraction 0.5 - 3 KDa</th>
<th>Molecular fraction 3 -10 KDa</th>
<th>Molecular fraction &gt;10 KDa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without added enzyme</td>
<td>110 mg/L</td>
<td>10 mg/L</td>
<td>60 mg/L</td>
</tr>
<tr>
<td>With EXTRALYSE® 5 g/hL</td>
<td>200 mg/L</td>
<td>20 mg/L</td>
<td>90 mg/L</td>
</tr>
</tbody>
</table>

This study shows that the specific enzymatic formulation EXTRALYSE® accelerates yeast autolysis by favouring the release of a larger quantity of molecules of interest, while also improving wine filterability and clarification.

Research work on enzymatic phenomena taking place during wine ageing. Anne Humbert (2005)
**IMPROVES FILTERABILITY**

Use of EXTRALYSE® favours hydrolysis of long-chain colloids, responsible for clogging filters. The Vmax index (Figure 2) shows a remarkable improvement in filterability for the wines treated with EXTRALYSE®.

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**IMPROVES CLARIFICATION**

The use of EXTRALYSE® at a dose of 10 g/hL significantly reduces turbidity, thus improving wine clarification.

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**REDUCES THE MICROBIAL LOAD**

EXTRALYSE® decreases the microbial load on colloids by improving the sedimentation of suspended particles.

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Add from halfway through the alcoholic fermentation and up to 3 weeks before bottling your wines.

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**Impact of treatment with EXTRALYSE® on the acetic acid bacteria population and VA of a wine during aging.**

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**Impact of EXTRALYSE® on wine filtrability, dose 10 g/hL, contact time 24h at 18°C.**

VMax = maximum volume at clogging. Makes it possible to assess wine filterability.

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**Turbidity values after treatment with EXTRALYSE® at 10 g/hL.**

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**LAFFORT & YOU**
For over 20 years, LAFORT® has been investing in research to:

- Identify and select the best vegetal tannin sources that complement the phenolic structure of wine.
- Constantly improve production and purification methods for raw materials.
- Build a greater understanding of the oenological implications of tannin usage.
- Develop the methods of tannin application in accordance with implemented oenological practices.

Thanks to its expertise, LAFORT® guarantees consistent quality formulation.

**The purpose of tannins in winemaking.**

Hydrolysable tannins (mainly ellagic from oak or chestnut, and gallic from chestnut galls) and condensed tannins (proanthocyanidic from grapes or exotic woods) are used in winemaking for different purposes:

- Unstable protein precipitation.
- Anti-oxidation.
- Structure enhancement.
- Regulates redox phenomena.
- Protection and stabilisation of colour.
- Reductive character minimization.
- Improves clarification.

**How to use tannins?**

All LAFORT® tannins benefit from the unique formulation Instant Dissolving Process (IDP), a revolutionary process for ease of use! The IDP process enables perfect solubility in wine and thus no preliminary dissolution of the tannins in water is required. Homogenous introduction into the bulk of the must or wine is, however, advised. It is recommended to carry out a systematic pump-over or other homogenising action during the application.

**The sacrificial effect of TANIN VR SUPRA®!**

During the first crushing of the fruit, proteins in the must bind with tannins and begin to precipitate. The first tannins available are the skin tannins, which are usually ripe and soft, and the ones that matter most for the future wine structure. Part of TANIN VR SUPRA® tannins added on the grapes is readily available to react with the proteins in the must, thus preserving skin tannins from precipitating.
# TANNINS

**FERMENTATION**

The essential element

<table>
<thead>
<tr>
<th>OBJECTIVE</th>
<th>GRAPE OR MUST TYPE</th>
<th>TANNIN</th>
<th>DOSAGE</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botrytised grapes, anti-oxidant action, laccase inhibition.</td>
<td></td>
<td>VR SUPRA®</td>
<td>10 - 80 g/hL, according to the health of the grapes.</td>
<td>Add as soon as possible to grapes, even before arrival in the winery. Perform laccase test in case of Botrytis.</td>
</tr>
<tr>
<td>Protein precipitation and skin tannin preservation.</td>
<td></td>
<td>VR SUPRA®</td>
<td>10 - 50 g/hL</td>
<td>Sacrificial effect. Add as soon as possible to grapes.</td>
</tr>
<tr>
<td>Protein precipitation.</td>
<td></td>
<td>GALALCOOL®</td>
<td>5 - 20 g/hL</td>
<td></td>
</tr>
<tr>
<td>Colour stabilisation.</td>
<td></td>
<td>VR COLOR®</td>
<td>15 - 80 g/hL</td>
<td>Add during the first third of fermentation.</td>
</tr>
<tr>
<td>Structure contribution.</td>
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<td>VR GRAPE®</td>
<td>10 - 40 g/hL</td>
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<tr>
<td></td>
<td></td>
<td>VR SUPRA®</td>
<td>10 - 80 g/hL</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>VR SUPRA® ÉLÉGANCE</td>
<td>10 - 80 g/hL</td>
<td></td>
</tr>
</tbody>
</table>

## TANIN VR SUPRA®

**Instantly dissolving (IDP) ellagic and proanthocyanidic tannin preparation.**

TANIN VR SUPRA® combines the effects of different tannins, selected and prepared for optimal technological efficiency, without adding bitterness, to facilitate:

- **Anti-oxidant** action providing protection of the must and the colour.
- **Wine structure** improvement by supplementation of the midpalate.
- Inhibition of natural oxidation enzymes (laccase, polyphenol oxidase) during harvesting of Botrytis affected vintages (more efficiently than SO2).
- Sacrificial effect: preserves the grape tannins from precipitation with the grape proteins, to favour indigenous tannin/anthocyanin reactions.

Dosage: 10 - 80 g/hL.

## TANIN VR SUPRA® ÉLÉGANCE

**An instantly dissolving (IDP process) formulation of proanthocyanidin and ellagic tannins.**

TANIN VR SUPRA® ÉLÉGANCE has been formulated to limit the astringency effect when tannin is added during fermentation. It allows for more precise management of extraction and maceration, mainly for the most delicate grape varieties (such as Pinot Noir) or when making red wines in a fruitier or lighter style. It is used under the same conditions as TANIN VR SUPRA®.

Dosage: 10 - 80 g/hL.
TANIN VR COLOR®
Instantly dissolving (IDP) catechin tannin preparation. Specially formulated to stabilise wine colour.

TANIN VR COLOR® is a non-astringent tannin which can be integrated into all profiles of wine colour.

TANIN VR COLOR® is used to improve the active tannin / anthocyanin ratio in such cases:
• Grapes harvested at sub-optimal phenolic ripeness.
• Grape varietals with a naturally poor tannin/anthocyanin ratio.
• Varietals that have colour management problems (extraction/stabilisation).

Dosage: 10 - 80 g/hL.

TANIN GALALCOOL®
Granulated gallic tannin preparation, to be used for white and rosé juice / must.

TANIN GALALCOOL® is a highly purified extract of chestnut gall tannins, with physio-chemical properties that are particularly well adapted to white and rose must vinification, including:
• Inhibition of natural oxidation enzymes (laccase, polyphenol oxidase), more efficiently than SO₂.
• Precipitation of some of the unstable proteins, as efficiently as bentonite but without aroma loss.
• Facilitates clarification.

Dosage: 5 - 20 g/hL.

TANIN VR GRAPE®
Instantly dissolving (IDP) grape proanthocyanidic tannin preparation.

Due to the high quality of its extraction, TANIN VR GRAPE® contains only a negligible quantity of phenolic acids, which are known as Brettanomyces substrates.

During the fermentation phase, TANIN VR GRAPE® allows:
• Compensation for natural grape tannin deficiency.
• Stabilisation of colour due to the formation of tannin-anthocyanin polymeric pigments.

Dosage: 10 - 40 g/hL.

Find Out More: Discover our IDP vidéo on our website, at LAFFORT & YOU (Video).
FOCUS // TANIN VR SUPRA® & TANIN VR COLOR®: THE WINNING TEAM

Tannins in winemaking have 4 points of interest:
- the "sacrificial" effect,
- the anti-oxidant effect,
- the co-pigmentation effect in the presence of colour components,
- the effect of stabilisation in the presence of acetaldehyde.

PRECIPITATION OF PROTEINS OR "SACRIFICIAL" EFFECT

Grape proteins combine and precipitate with phenolic compounds. This precipitation reduces the natural amount of grape tannins and can be limited due to the "sacrificial" effect: by using extra tannins that will combine specifically to the proteins. This "sacrificial" effect can be evaluated in the laboratory by measuring the tannins reactivity with a reference protein such as BSA.

TANIN VR SUPRA® provides a strong protective effect for natural grape phenolic compounds. Its reactivity is 5 times superior than other vinification tannins.

THE ANTIOXIDANT EFFECT

The use of tannins has always been linked to their ability to moderate the effects of oxygen. They have antioxidant properties and protect the oxidisable compounds. It has been proven that 30 g/hL of TANIN VR SUPRA® added in increments during fermentation reduces the amount of dissolved O₂ three fold in must at the beginning of the fermentation which limits the oxidation risk of easily oxidisable compounds.

THE INHIBITION OF LACCASE ACTIVITY

Botrytis on grapes brings with it some laccase and polyphenol oxidase activities that are negative for wine quality. In Botrytis affected musts, the addition of TANIN VR SUPRA® efficiently limits the negative enzymatic oxidase activities.
THE CO-PIGMENTATION EFFECT

Co-pigmentation comes from the association of coloured pigments with other polyphenolic compounds, usually non-coloured. This association leads to stable co-pigments showing a more intense colour than the single coloured molecules. Red wines that are rich in co-pigments will have a more intense colour at both early and late stages of the vinification. TANIN VR SUPRA® and TANIN VR COLOR® are both tannins with a high co-pigmentation ability.

CONDESA TION EFFECT (STABILISATION OF COLOUR)

Acetaldehyde molecules are involved in stabilising simple coloured phenolic structures through reactions leading to more complex molecules. The efficiency of the tannin/anthocyanin bond via an acetaldehyde bridge can be simply demonstrated by saturating a tannin solution with acetaldehyde and then observing the evolution of turbidity over time. A benchmarking study has been done with many tannins available on the market using this method: TANIN VR COLOR® was more than 100 times more reactive than the closest competitor product.

SPECIFIC CASE: LACK OF PHENOLIC MATURITY

When harvest is not at optimal phenolic ripeness, the qualities of TANIN VR SUPRA® and TANIN VR COLOR® are complementary.

Thanks to its remarkable “sacrificial” effect, TANIN VR SUPRA® helps protect the natural extractable grape tannins from precipitating with naturally occurring proteins, while TANIN VR COLOR® brings balance to the tannin/anthocyanin ratio and promotes the production of stable coloured compounds.

<table>
<thead>
<tr>
<th></th>
<th>TANIN VR SUPRA®</th>
<th>TANIN VR COLOR®</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Sacrificial&quot; effect</td>
<td>*****</td>
<td>*</td>
</tr>
<tr>
<td>Anti-laccase reaction</td>
<td>*****</td>
<td>**</td>
</tr>
<tr>
<td>Antioxidant effect</td>
<td>****</td>
<td>***</td>
</tr>
<tr>
<td>Co-pigmentation effect</td>
<td>***</td>
<td>****</td>
</tr>
<tr>
<td>Condensation effect (Colour stabilisation)</td>
<td>*</td>
<td>*****</td>
</tr>
</tbody>
</table>

TANIN VR SUPRA® is added to the must after the crusher or during the first pump over (if no evidence of Botrytis) (20 - 80 g/hL according to the sanitary state of the harvest). TANIN VR COLOR® is added during the alcoholic fermentation during the colour extraction phase at 10 to 30 g/hL. Whenever the vintage looks like a difficult one with challenges for grapes with optimal phenolic ripeness, the use of proper tannins, for example, TANIN VR SUPRA® and TANIN VR COLOR® will be a key point to successful vinifications.
VEGETAL PROTEINS
Patatin, potato protein isolate

**VEGECOLL®**
Vegetal protein (patatin, potato protein isolate) for must and wine clarification.
• Allergen-free, non-animal, non-GMO.
• Very high Zêta potential, fast clarification.
• The most reactive vegetal protein in oenology to this day.
• No risk of overfining.
• Fast and compact flotation at low dosage, with better aroma preservation than traditional flotation fining agents.

Dosage:
* Flotation: 3 - 10 g/hL (VEGECOLL® Poudre) / 60 - 200 mL/hL (VEGECOLL® Liquide).
* Fining of free run white and rose juice for oxidation prevention: 3 - 20 g/hL.
* Fining of press juice (light press) to eliminate oxidised phenolic compounds: 10 - 30 g/hL.

**VEGECOLL®** is now available in liquid form.

**Aromatic profile optimisation**

- Esters
  - Rose (PE)
  - Rose (APE)
  - Floral (C4C2)
  - Floral (C6C2)
  - Floral (C8C2)
  - Floral (C10C2)

- Thiols
  - Boxwood (4MSP)
  - Grapefruit (3SH)
  - Tropical fruits (A3SH)

**Flotation: short compaction time and very compact lees.**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>LEES COMPACTION TIME</th>
<th>LEES HEIGHT</th>
<th>FINAL TURBIDITY (NTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEGECOLL® 5 g/hL</td>
<td>≈ 30 min</td>
<td>&lt; 10%</td>
<td>56</td>
</tr>
<tr>
<td>Gelatin 100 mL/hL</td>
<td>≈ 1h30 min</td>
<td>&gt; 10%</td>
<td>53</td>
</tr>
</tbody>
</table>

*Trial with Colombard juice volume of 1000 hl.*

**Find out more:** Watch our VEGECOLL® video on our website at LAFFORT & YOU (Video).
POLYMUST® V
Association of vegetal protein (pea) with PVPP for the preventive treatment of oxidation in white and rosé musts and wines.
• Prevention of oxidation.
• Elimination of oxidisable phenolic compounds liable to trap aromas and distort the colour.
• Compatible with floatation and for treatment of wines.
Dosage: 30 - 80 g/hL.

POLYMUST® ROSÉ
Association of PVPP with vegetal protein (patatin, potato protein isolate) for the fining of white and rosé musts and wines.
• Elimination of phenolic acids.
• Stabilisation of the colour of rosé musts and wines in fermentation.
Dosage: 30 - 80 g/hL.

POLYMUST® DC
Association of vegetal protein (pea) with calcium bentonite and activated charcoal for the fining of musts, young wines in fermentation and white wines.
• Stabilisation of the colour and elimination of oxidised compounds.
• Decontamination of must or wines in fermentation.
• Selective adsorption of unstable proteins in the wine, to initiate protein stabilisation.
Dosage: 50 - 120 g/hL. For rosé musts, refer to the technical specifications issued by the control body for the area of production.

POLYMUST® PRESS
Association of PVPP, calcium bentonite and vegetal protein (patatin, potato protein isolate) for the preventive fining of press wines and the reduction of oxidised character.
• Refining red press wines: clarification, stabilisation of the colouring matter, reduction of astringency and green and metallic notes, microbiological stabilisation.
Dosage: 15 - 50 g/hL on red press wine.
40 - 100 g/hL on white and rosé press wines.

POLYMUST® ORG
Association of vegetal protein (pea) and calcium bentonite suitable for fining wine.
• Remarkable clarification effect.
• Preventive and curative treatment of polyphenol oxidation in white and rosé wines.
Dosage: 20 - 60 g/hL.
50 - 100 g/hL for rosé.
### JUICE FINNING

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CASEI PLUS</strong></td>
<td>Potassium caseinate developed for treatment of oxidation phenomena and maderisation in juice (white and rosé).</td>
<td>5 - 20 g/hL for clarification. 20 - 60 g/hL for maderisation treatment and colour correction.</td>
<td>1 kg 5 kg 20 kg</td>
</tr>
<tr>
<td><strong>POLYLACT®</strong></td>
<td>Combination of PVPP and casein for preventing and treating oxidation in juice (white and rosé).</td>
<td>Preventative treatment: 20 - 40 g/hL Curative treatment: 40 - 100 g/hL</td>
<td>1 kg 10 kg</td>
</tr>
<tr>
<td><strong>MICROCOL® ALPHA</strong></td>
<td>High quality natural sodium microgranular bentonite with a high adsorption capacity. Intended for protein stabilisation in juice over a large pH.</td>
<td>10 - 80 g/hL</td>
<td>1 kg 5 kg 25 kg</td>
</tr>
<tr>
<td><strong>GECOLL® SUPRA</strong></td>
<td>Liquid gelatine produced from a selection of exceptionally pure raw materials, exclusively of porcine origin.</td>
<td>40 - 100 mL/hL</td>
<td>1.05 kg 5.25 kg 21 kg</td>
</tr>
<tr>
<td><strong>GECOLL® FLOTTATION</strong></td>
<td>Liquid gelatine highly reactive for flotation.</td>
<td>30 - 70 mL/hL (depending on the type of must, pH and condition).</td>
<td>10.5 kg</td>
</tr>
<tr>
<td><strong>VINICLAR®</strong></td>
<td>Microgranulated preparation of PVPP for preventive and curative treatment of the oxidation of juice. <strong>VINICLAR®</strong> contains a small amount of cellulose for a better clarification and easier.</td>
<td>15 - 30 g/hL for preventive use. 30 - 80 g/hL for curative use of oxidised wine or must.</td>
<td>1 kg 25 kg</td>
</tr>
<tr>
<td><strong>VINICLAR® P</strong></td>
<td>Microgranulated preparation of PVPP for preventive and curative treatment of the oxidation of juice.</td>
<td>20 - 50 g/hL</td>
<td>1 kg 22.7 kg</td>
</tr>
<tr>
<td><strong>VINICLAR® GR</strong></td>
<td>Microgranulated preparation of PVPP preventive and curative treatment of the oxidation of juice.</td>
<td>15 - 30 g/hL for preventive use. 30 - 80 g/hL for curative use of oxidised wine or must.</td>
<td>1 kg 20 kg</td>
</tr>
</tbody>
</table>

*Find out more: Discover our MICROCOL® ALPHA video on our website at LAFFORT & YOU (Video).*
# SPECIFIC TREATMENTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPRAROM®</td>
<td>Preparation containing condensed tannins, potassium metabisulphite and ascorbic acid. Preventive and curative treatment for must oxidation.</td>
<td>10 - 25 g/100 kg grapes.</td>
<td>1 kg</td>
</tr>
<tr>
<td>GEOSORB® GR</td>
<td>Decontaminant for fermenting musts and young wines for reducing geosmin and octenone content.</td>
<td>Action on geosmin: 15 - 25 g/hL. Action on octenone: 35 - 45 g/hL.</td>
<td>5 kg 15 kg</td>
</tr>
<tr>
<td>CHARBON ACTIF PLUS GR</td>
<td>Activated carbon in granulated.</td>
<td>20 - 100 g/hL</td>
<td>5 kg</td>
</tr>
<tr>
<td>CHARBON ACTIF LIQUIDE HP</td>
<td>Activated carbon in a stabilised aqueous solution. High capacity of colour correction.</td>
<td>120 - 400 mL/hL</td>
<td>10.5 kg</td>
</tr>
</tbody>
</table>

**OPTIMISED DECOLORISATION**

In AF, think of the combined use of a finning agent (POLYMUST® range) with CHARBON ACTIF LIQUIDE HP.
AGEING PRODUCTS

48 Yeast products
MANNOFEEL®
OENOLEES® MP
OENOLEES®

50 Enzymes
Ageing enzymes

51 Tannins
Ageing tannins
QUERTANIN® range

54 Fining
VEGECOLL® - Vegetal protein
(Patatin, potato protein isolate)
POLYMUST® range
Juice finning

59 Specific Treatments
Activated carbon

60 Stabilisation
Microbial stabilisation
Colloidal stabilisation
Protein stabilisation
Tartaric stabilisation

65 Preservatives
MANNOFEEL® is the result of global research by LAFFORT® on mannoproteins to identify and understand the mechanism of action and production. The selected mannoproteins in MANNOFEEL® significantly increase the perception of volume, roundness and length on the palate.

• Pure product, 100 % mannoproteins. Natural compound present in wine.
• Respects the freshness and fruit in wine.
• 100% soluble with an immediate action.
• Participates in tartaric stabilisation of wine.
• Participates in stabilising the colouring matter.
• Excellent filterability. MANNOFEEL® does not change the filterability of wine.
Dosage: 25 - 150 mL/hL.

OENOLEES® and OENOLEES® MP are oenological products derived from natural constituents found in wine and obtained using innovative and patented production processes. These products are paving the way for a new type of oenology: more natural, more specific while enhancing and preserving the integrity of wine.

OENOLEES® MP
Yeast cell wall extract (mannoproteins) rich in sapid peptide (Patent EP 1850682) and polysaccharides.

• Contributes to increasing the sweetness sensation in wines (red and white).
• Allows the winemaker to better counter-balance acidity and bitterness.
• Can be used just prior to bottling.
Dosage: 10 - 30 g/hL.

Concentration in Hsp12 (origin of peptides responsible for the perception of sweetness in wine) in different products of equivalent application standardised according to the most concentrated product at 100%.
OENOLEES®
OENOLEES® contributes towards improving organoleptic quality in wine by:
• Reducing aggressive sensations: refining action that promotes elimination of certain polyphenols responsible for bitterness and astringency.
• Increasing sweet sensations: specific peptide fraction that has an extremely low perception threshold (16 mg/L against 3 g/L for sucrose).
• Helps to reduce Ochratoxin A levels.
Dosage: 20 - 40 g/hL.
OMRI: Listed for use in organic winemaking.

Treatment must be done at least 4 to 6 weeks before bottling.
Concentration in Hsp12 (origin of peptides responsible for the perception of sweetness in wine) in different products of equivalent application standardised according to the most concentrated product at 100%.

HSP12 - PATENT EP 1850682
A large amount of R&D work (A. Humbert’s thesis, 2005; Patent EP 1850682, 2006; Marchal et al., J. Agric. Food Chem. 2011) have made it possible to understand the origin of the sapid fraction derived from yeast during its autolysis. These discoveries have now been used to select specific yeast derivatives, rich in sapid peptides derived from the protein Hsp12 (Heat Shock Protein, 12kDa), for the efficient formulation of preparations such as OENOLEES® and OENOLEES® MP.
Figure: Detection by HPLC C18 RP of the peptides derived from the Hsp12 membrane protein in a fraction of derivatives from selected yeasts.
**EXTRALYSE®**

*Designed for enhanced clarification and filtration of wines allows for enhanced mouthfeel and perceived sweetness.*

- Microgranulated preparation of pectolytic enzymes rich in β-(1-3 ; 1-6) glucanase.
- Purified from CE to help preserve aromatic finesse of wines. Brings roundness and softness to the wine by releasing larger quantities of yeast-derived molecules.
- Improves the filterability and clarification of wines especially in case of wines affected by *Botrytis cinerea.*

Dosage: 6 - 10 g/hL.

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**LAFAZYM® AROM**

*Designed for enhancing the aromatic profile of wines from Muscat, Riesling, Gewürztraminer, Chenin, Grenache, Syrah...*

- Microgranulated preparation of pectolytic and β-glycosidase enzymes.
- Increases aromatic intensity of wines from grape varieties with glycosylated precursors of terpenes and norisoprenoids.
- Preferably use on finished wine or base wines for sparkling.

Dosage: 2 - 4 g/hL.

LAFAZYM® AROM increases the amount of free terpenes in wines.

*Example of a Gewurztraminer (LAFAZYM® AROM: 5 g / hL - 8 1/2 weeks) compared to the non-treated control. There is an increase in geraniol which has a perception threshold of 130 μg/L in wines.*

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**LYSOZYM**

*Designed for microbial management of Gram positive bacteria.*

- Microgranulated muramidase enzyme preparation. Degrades Gram+ lactic acid bacteria cell wall.
- Delays the action of lactic acid bacteria, reducing the need for SO₂.
- Strengthens the action of SO₂ on the sweet white wines and improves microbiological stability.
- In red winemaking, avoids early onset of MLF during long maceration, sluggish or stuck alcoholic fermentation or in the case of a micro-oxygenation.
- Limits competition between yeast and bacteria.

Dosage: 10 - 50 g/hL.
TAN’COR® GRAND CRU
Preparation of proanthocyanidic tannins derived from grapes and ellagic tannins from oak. Utilises LAFFORT®’s Instant Dissolving Process (IDP). For use during red wine maturation.

After the fermentation phase or during maturation, TAN’COR® GRAND CRU is used to:
• Enhance and modify the wine’s structure and palate length.
• Stabilise colour by combining the remaining free anthocyanins.
• Regulate oxidation-reduction phenomena.

Dosage: 5 - 30 g/hL.

TAN’COR®

TAN’COR® combines the properties of ellagic and proanthocyanidic tannins specially prepared for the treatment of red wines after the fermentation phase or during maturation, and is used to:
• Enhance and modify the structure of the wine and prepare it for maturation.
• Protect of the wine with regards to oxidation phenomena.
• Regulate oxidation-reduction phenomena.

Dosage: 10 - 30 g/hL.

Fin Out More: Discover our IDP video on our website, at LAFFORT & YOU (Video).
TANIN VR GRAPE®
Proanthocyanidic tannins extracted from grapes. Utilises LAFFORT®’s Instant Dissolving Process (IDP).
Thanks to the high quality of its extraction, TANIN VR GRAPE® contains only a negligible quantity of phenolic acids, which are known as Brettanomyces substrates.
During the fermentation phase or maturation, TANIN VR GRAPE® allows:
• Compensation for natural grape tannin deficiency.
• Stabilisation of colour due to the formation of tannin-anthocyanin polymeric pigments.
Dosage: 10 - 40 g/hL.

TANFRESH®
Instantly dissolving (IDP) ellagic and proanthocyanidic tannin preparation based on grape tannins.
• To refresh white and rosé wine (against oxidation, atypical ageing).
• To boost structure and mouthfeel.
• To help eliminate reductive odours.
Dosage: 0.5 - 6 g/hL.

TANIN GALALCOOL® SP
Preparation of very pure gallic tannins, extracted from gall nuts.
TANIN GALALCOOL® SP has a specially adapted formulation that respects the organoleptic balance of wines on the palate while maintaining the same oenological properties as TANIN GALALCOOL® (see P. 40).
Dose: 2 - 5 g/hL.
QUERTANIN® RANGE
A variety of preparations of “stave wood”- quality ellagic tannins, extracted from oak heartwood or ellagic
tannins sourced from oak heartwood and gallic tannins in instant-dissolving form (IDP), for the maturation of
white, rosé and red wines.
• Regulates oxidation-reduction phenomena during maturation in barrels or during micro-oxygenation.
• With used barrels, the QUERTANIN® range allows the recreation of a medium rich in ellagic tannins similar to a
new barrel.
• After the addition, it is recommended to carry out normal rackings until fining or bottling preparation.

DOSAGE
It is specified in the Oenological Codex that tannins “must not change the olfactory properties and the colour of
wine”. The dosage rates will therefore vary in function of the wine matrix, and shall be determined after trials.

Tannin content extracted from the oak is lower in used barrels. The ellagic tannin
protective effect is decreased and the wine
becomes subject to premature oxidation.
Adding QUERTANIN® allows recreation of
the buffering qualities provided by tannins
extracted from new barrels thus protecting
the wine from the oxidation phenomena.
### FINING AND CO-FINING AGENTS PREPARATION AND TREATMENT TIME

<table>
<thead>
<tr>
<th>Agent</th>
<th>Preparation/Addition</th>
<th>Over fining risk</th>
<th>Treatment contact time before racking or filtration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VEGECOLL®</strong></td>
<td>Dissolve in 10 times its weight in water. Homogenise.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POLYMUST®</strong></td>
<td></td>
<td><strong>Check labels and technical data sheet for more information</strong></td>
<td>1 - 2 weeks</td>
<td>Non allergen</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>Dissolve in 10 times its weight in water. Add to the tank during a pump-over.</td>
<td>✔</td>
<td>1 - 3 weeks</td>
<td>Non allergen</td>
</tr>
<tr>
<td><strong>Gelatine</strong></td>
<td>Liquid: gradually add during a pump-over, then homogenise carefully.</td>
<td>✔</td>
<td>1 - 3 weeks</td>
<td></td>
</tr>
<tr>
<td><strong>Egg Albumin</strong></td>
<td>Solid: dissolve carefully in hot water (40°C) at 50 g/L and keep in hot water bath during incorporation.</td>
<td>✔</td>
<td>1 - 3 weeks</td>
<td>Refer to local legislation for specific labelling (allergen).</td>
</tr>
<tr>
<td><strong>Isinglass</strong></td>
<td>Dissolve at 10g/L. Let swell for 2 hours, and stir to optimise dispersion. If gelling appears too fast, add more water. Add to the wine and homogenise.</td>
<td>✔</td>
<td>2 - 4 weeks</td>
<td></td>
</tr>
<tr>
<td><strong>Casein</strong></td>
<td>Mix in 10 times its weight in water until dissolved. Add to the wine during a pump-over then homogenise.</td>
<td>✔</td>
<td>10 days - 3 weeks</td>
<td>Refer to local legislation for specific labelling (allergen).</td>
</tr>
<tr>
<td><strong>PVPP</strong></td>
<td>Suspend in 4 times its weight in water, 1 hour prior use.</td>
<td>✔</td>
<td>10 days - 3 weeks</td>
<td></td>
</tr>
<tr>
<td><strong>Bentonite</strong></td>
<td>Dissolve in 10 times its weight in water, and keep stirring for 2 hours (Hot water 50°C is recommended). Let it hydrate for 12 - 24 hours. Mix to obtain a homogenous preparation before incorporation. Homogenise after addition.</td>
<td>✔</td>
<td>5 days - 2 weeks</td>
<td>Can be used on young red wine to eliminate unstable colouring matter.</td>
</tr>
<tr>
<td><strong>OENOLEES®</strong></td>
<td>Dissolve in 5 - 10 times its weight in water. Homogenise after addition.</td>
<td></td>
<td>4 - 6 weeks</td>
<td></td>
</tr>
</tbody>
</table>

* During fining bench trials in laboratory.
** Preparation: The efficiency of the treatment highly depends on the quality of the preparation.
*** Contact time: the settling time will depend on the temperature of the wine, the volume and the shape of the tank, the use of Silica gel.
**VEGETAL PROTEIN**
Patatin, potato protein isolate

**VEGECOLL®**
Vegetal protein (Patatin, potato protein isolate) for wine clarification.
- Allergen-free, non-animal, non-GMO.
- Very high Zêta potential, fast clarification.
- The most reactive vegetal protein in oenology to this day.
- No risk of overfining.

Dosage for red wines:
- To stabilise colouring matter: 1 - 3 g/hL.
- To reduce astringency, bitterness and vegetal notes: 2 - 5 g/hL.

White and rosé wines fining: 1 - 10 g/hL.

The Zêta potential evaluates the interaction between colloids and the fining agents that contribute to flocculation. The clarification rate depends on the Zêta potential and the size of the particles (Iturmendi et al., 2012). For faster clarification, Zêta potential values must be high (whether positive or negative).

**COLOURING MATTER STABILITY TEST**
- Measure turbidity of original sample (NTU before cold).
- If turbidity is > 2 NTU, filter 30 mL on a 0.65 μm membrane.
- Place 30 mL (filtered or not) for 48 hours at +4°C/ 39.2°F.
- Agitate the cold sample. Measure turbidity after 15 minutes at room temperature (NTU after cold).

\[ \Delta \text{NTU} = \text{NTU After Cold} - \text{NTU Before Cold} \]

- < 5 NTU Stable
- 5 - 10 NTU Slight Instability
- 10 - 20 NTU Medium Instability
- 20 - 50 NTU Significant Instability
- > 50 NTU Very Unstable

Press wines of Syrah and Grenache treated to 50 g/hL, control on left and wine treated with VEGECOLL® on right. The VEGECOLL® effect on the hue is visible and significant.

Find Out More:
Discover our VEGECOLL® video on our website, at LAFFORT & YOU (Video).
**PRODUCT** | **DESCRIPTION** | **DOSAGE** | **PACKAGING**
--- | --- | --- | ---
POLYMUST® V | Blend of vegetal protein (pea) and PVPP for preventive treatment of oxidation of white and rosé wines. | 30 - 80 g/hL | 1 kg
 |  |  | 10 kg

CASEI PLUS | Potassium caseinate developed for treatment of oxidation phenomena and madeirisation in wines. | 20 - 60 g/hL for maderisation treatment and colour correction. | 1 kg
 |  |  | 5 kg

POLYLACT® | Combination of PVPP and casein for preventing and treating oxidation in wine (white and rosé). | 15 - 90 g/hL | 1 kg
 |  |  | 10 kg

ARGILACT® | Combination of casein and bentonite for treating wines (white and rosé) against oxidation. | 40 - 100 g/hL | 1 kg
 |  |  | 25 kg

VINICLAR® | Granulated preparation of PVPP for preventive and curative treatment of the oxidation of wines. VINICLAR® contains a small amount of cellulose for a better clarification and easier filtration. | 15 - 30 g/hL for preventive use. 30 - 80 g/hL for curative use of oxidised wine. | 1 kg
 |  |  | 25 kg

VINICLAR® P | Granulated preparation of PVPP. | 20 - 50 g/hL | 1 kg
 |  |  | 25 kg

VINICLAR® GR | Granulated preparation of PVPP Preventive and curative treatment of the oxidation of wines. | 15 - 30 g/hL for preventive use. 30 - 80 g/hL for curative use of oxidised wine. | 1 kg
 |  |  | 20 kg
POLYMUST® V
Association of vegetal protein (pea) with PVPP for the preventive treatment of oxidation in white and rosé wines.
• Prevention of oxidation.
• Elimination of oxidisable phenolic compounds liable to trap aromas and distort the colour.
Dosage: 30 - 80 g/hL.

POLYMUST® ROSÉ
Association of PVPP with vegetal protein (Patatine, Potato Protein Isolate) for the fining of white and rosé wines.
• Stabilisation of the colour and elimination of oxidised compounds.
• When used on finished wine, it is best to rack within 5 days following treatment.
Dosage: 5 - 20 g/hL.

POLYMUST® DC
Association of vegetal protein (pea) with calcium bentonite and activated carbon for the fining of musts, young wines in fermentation and white wines.
• Stabilisation of the colour and elimination of oxidised compounds.
• Selective adsorption of unstable proteins in the wine, to initiate protein stabilisation.
Dosage: 50 - 120 g/hL.

POLYMUST® PRESS
Association of PVPP, calcium bentonite and vegetal protein (Patatin, potato protein isolate) for the preventive fining of press wines and the reduction of oxidised character.
• Refining red press wines: clarification, stabilisation of the colouring matter, reduction of astringency, greenness and metallic notes, microbiological stabilisation.
Dosage: 15 - 50 g/hL.

POLYMUST® ORG
Association of vegetal protein (pea) and calcium bentonite suitable for fining wine.
• Remarkable clarification effect.
• Preventive and curative treatment of polyphenol oxidation in white and rosé wines.
Dosage: 20 - 60 g/hL.
# GELATINS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>GECOLL® SUPRA</td>
<td>Liquid gelatin produced from a selection of exceptionally pure raw materials, exclusively of porcine origin. Eliminates the tannins responsible for aggressive or astringent characters.</td>
<td>40 - 100 mL/hL</td>
<td>1.05 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.25 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 kg</td>
</tr>
<tr>
<td>GELAROM®</td>
<td>Liquid gelatin produced from a selection of exceptionally pure raw materials, exclusively of porcine origin. Intended to bring out the organoleptic potential of the wine.</td>
<td>30 - 60 mL/hL</td>
<td>1.05 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.25 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 kg</td>
</tr>
<tr>
<td>GELAFFORT®</td>
<td>Liquid gelatin, exclusively of porcine origin. Wine clarification agent.</td>
<td>10 - 30 mL/hL</td>
<td>1.1 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.5 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>22 kg</td>
</tr>
<tr>
<td>GÉLATINE EXTRA N°1</td>
<td>Highly purified heat soluble gelatin. Fining of red wines for ageing.</td>
<td>6 - 10 g/hL</td>
<td>1 kg</td>
</tr>
</tbody>
</table>

# OTHERS PRODUCTS FOR STABILISATION AND ORGANOLEPTIC FINE TUNING

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALBUCOLL®</td>
<td>Liquid preparation of egg white for the fining and clarification of red wines.</td>
<td>30 - 80 mL/hL</td>
<td>1 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 mL ALBUCOLL® is equivalent to 1 fresh egg white.</td>
<td>5 kg</td>
</tr>
<tr>
<td>OVOCLARYL® (EGG ALBUMIN IN POWDER)</td>
<td>Egg albumin fining agent which is particularly adapted for reducing and harmonising excess polyphenolic fractions in red wines.</td>
<td>6 - 10 g/hL</td>
<td>1 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 g of OVOCLARYL® corresponds to 1 fresh egg white.</td>
<td></td>
</tr>
<tr>
<td>ICHTYOCOLLE®</td>
<td>Fish-based (Isinglass) fining agent adapted to high-grade white and rosé wine fining and clarification. ICHTYOCOLLE® restores high organoleptic clarity and remarkable brilliance to treated wines.</td>
<td>0.5 - 1.5 g/hL</td>
<td>250 g</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>500 g</td>
</tr>
<tr>
<td>SILIGEL®</td>
<td>Colloidal silica solution that may be used in combination with all organic fining agents.</td>
<td>20 - 100 mL/hL - use 0.5 to 1 mL of SILIGEL® for 1 mL of gelatin. Add SILIGEL® prior to gelatine.</td>
<td>1.3 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 kg</td>
</tr>
</tbody>
</table>
### SPECIFIC TREATMENTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>REDOXY PLUS</td>
<td>Preparation containing potassium metabisulphite, citric acid and ascorbic acid. Preventive treatment for wine oxidation.</td>
<td>5 - 15 g/hL</td>
<td>1 kg</td>
</tr>
<tr>
<td>SULFIREDOX</td>
<td>Copper sulphate solution dissolved in water at 25 g/L.</td>
<td>2 - 10 mL/hL</td>
<td>1 kg, 5 kg</td>
</tr>
</tbody>
</table>

#### Activated Carbon*

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARBON ACTIF LIQUIDE HP</td>
<td>Activated carbon in a stabilised aqueous solution. Treatment of pinking in white wines.</td>
<td>120 - 400 mL/hL</td>
<td>10.5 kg</td>
</tr>
<tr>
<td>CHARBON ACTIF SUPRA 4</td>
<td>Food-grade activated carbon. Treatment of pinking in white wines.</td>
<td>20 - 100 g/hL</td>
<td>5 kg, 15 kg</td>
</tr>
<tr>
<td>CHARBON ACTIF PLUS GR</td>
<td>Food-grade activated carbon in granular form. Powerful ability to remove pinking from white wines. Elimination of oxidation-producing phenolic compounds.</td>
<td>10 - 100 g/hL</td>
<td>5 kg</td>
</tr>
</tbody>
</table>

* The usage of active carbon is regulated, please check the current regulations.

![Graph showing optical density](image)

Treatment for a claret production at 40 g/hL. 2 hours contact before optical density measurements.
OENOBRETT®
Chitosan and enzyme based preparation for the control of Brettanomyces spoilage.

- Disruption of the membrane and the cell space by chitosan.
- The synergistic effect of enzymes accelerate the settling of lysed cells. The decrease of the Brettanomyces population is significant and thus prevents spoilage.
- The antimicrobial action of OENOBRETT® is an essential tool within a SO₂ reduction strategy.
- To be used after fermentations (AF and MLF).
- Available in barrel doses (23 g).

Dosage: 10 g/hL.

OENOBRETT® ORG
100% chitosan based product of fungal origin for the control of the Brettanomyces spoilage.

- Disruption of the membrane and the cell space by chitosan.
- The antimicrobial action of OENOBRETT® ORG is an essential tool within a SO₂ reduction strategy.
- To be used after fermentations (AF and MLF).
- Ease of use formulation.

Dosage: 4 - 10 g/hL.

MICROCONTROL®
Formula made from chitosan, vegetable protein (patatin, which is a potato protein isolate) and enzymes for reducing the microbial load, as well as protecting wines against certain unfavourable microorganisms.

Biocontrol product.

- Reduction of the overall microbial load (yeast, lactic acid bacteria, acetic acid bacteria*).
- “Antioxidant” function of eliminating oxidised or oxidisable phenolic compounds occurring in white and rosé wines.
- A wine vinification tool for use in a SO₂ reduction sequence.
- Improvement in the clarification and filterability of wines.
- Treatment is possible before alcoholic fermentation. Using this formula between AF and MLF can slow down the beginning of MLF.

Dosage: 10 g/hL.

* reduction in microbial populations by binding.

BACTICONTROL®
Formula made from chitosan, lysozyme & enzymes for protecting wines against certain microorganisms and particularly lactic bacteria. Biocontrol product.

- Microbiological protection of white, red and rosé wines after fermentation.
- A wine vinification tool for use in a SO₂ reduction sequence.
- Makes it possible to slow down or even stop a MLF in progress or avoid its onset (treatment is possible before or after AF).
- Synergistic action by β-glucanases and LYSOZYME on lactic acid bacteria, particularly ropy pediococcus (as enzymatic action on polysaccharides can create a widespread barrier around the bacteria and interfere with the action of LYSOZYME).
- Prevents organoleptic deviation due to degrading microorganisms.
- Improvement in the clarification and filterability of wines.

Dosage: 15 - 20 g/hL.
STABIVIN®
Pure Verek arabic gum solution with high grade protection index (>8) for stabilising unstable colouring matter in red wines.
Hydrophilic colloid which aims to counter hazes and colloidal deposits, allowing the wine to retain maximum clarity:
• Stabilises unstable colouring matter.
• Increases protection with regard to metallic or protein casses.
Synergistic action with POLYTARTRYL®, for improved stabilisation with regard to tartaric precipitations.
Dosage: 70 - 150 mL/hL.

STABIVIN® SP
Gum arabic solution manufactured from highly purified gums.
• Due to its specific manufacturing procedure and the strict selection of the arabic gum used, STABIVIN® SP contributes to the colloidal structure of the wines (softness and mouthfeel).
• Very low clogging index.
• Softening of wines by tannins "coating".
• STABIVIN® SP is an arabic gum solution with low SO₂ concentration (2 g/L).
Dosage: 100 - 300 mL/hL.

STABIFIX®
Solution of selected and purified gum arabic.
• Stabilises otherwise unstable colouring matter.
• Increases protection against metallic casse.
Dosage: 70 - 150 mL/hL.

OENOGOM® INSTANT
Pure gum arabic in rapid dissolving micro-granular form (IDP process).
• Stabilisation of the colouring matter of red wines.
• Softening of wines by "coating" the tannins.
• Recommended for the production of wines without SO₂.
Dosage: 20 - 100 g/hL.

OENOGOM® BIO
Pure gum arabic in rapid dissolving micro-granular form (100% verek).
• Stabilisation of the colouring matter of red wines.
• Increase protection towards metallic hazes.
• Recommended for the production of wines without SO₂.
Dosage: 20 - 30 g/hL.
MICROCOL® ALPHA
High quality natural sodium microgranular bentonite with a high adsorption capacity. Intended for protein stabilisation in wines over a large pH range.
• Stabilising properties in regard to heat-sensitive proteins.
• Wide stabilising action spectrum.
• Clarifying capacity and compact lees.
• Aromatic preservation.
• Helps colour stabilisation.
• Improves wine brightness.
Dosage: 10 - 80 g/hL.

Find Out More: Watch our MICROCOL® ALPHA video on our website, at LAFFORT & YOU (Video).

MICROCOL® FT
Natural sodium-calcium bentonite for protein stabilisation of wines during cross-flow filtration.
• Due to its high purity, MICROCOL® FT contains very little crystalline silica, which is responsible for the abrasion of membranes.
• The particle size is controlled, which avoids clogging the filters or having residues of micro-particles after filtration.
Dosage: 30 - 80 g/hL.

MICROCOL® CL G
Natural calcium bentonite, possessing excellent settling capacity and high protein adsorption power and allows for faster settling with formation of very compact lees.
• Possesses excellent specific adsorption power reacting efficiently with positively charged macromolecules.
• Preserves aromatic intensity and improves brightness and colour.
Dosage: 20 - 100 g/hL.
**CELSTAB®**

**CELSTAB®** is a solution of cellulose gum, a highly purified polymer of vegetable origin (from wood) with a low degree of polymerisation and lower viscosity. Its liquid formulation at a concentration of 100 g/L facilitates its incorporation in wine.

- Intended for wine stabilisation in relation to potassium bitartrate crystallisation.
- **CELSTAB®** is a highly purified cellulose gum. Its composition is uniform (only one peak - HPLC).
- Inhibits microcrystal nucleation and growth phases (through disruption of surfaces responsible for the formation of crystals).
- **CELSTAB®** has a very high inhibitory power (by optimal degree of substitution), and allows stabilisation of highly tartaric-unstable wines.
- **CELSTAB®** is the liquid CMC with the lowest SO₂ concentration on the market.

Maximum legal dosage: 100 mL/hL.

*In the case of use on red or rosé wines, there is a strong risk of **CELSTAB®** interacting with colouring matter potentially leading to the formation of haze and/or a precipitate. On rosé wines, we recommend to systematically test for crystallisation (6 days at -4°C) before use.*

**MANNOSTAB® LIQUIDE 200**

Contains the only mannoprotein naturally present in wines with the ability for potassium tartrate stabilisation: MP40. It is enzymatically extracted from the yeast cell wall according to a patented process (Patent No 2726284) which preserves and ensures the tartaric stabilisation capacity of MP40.

- Inhibition of potassium bitartrate salts crystallisation.
- Treatment organoleptically neutral to the wine.
- Natural compound already present in the wines.
- Stabilises white, rosé and red wines; still and sparkling wines; filtered and non filtered wines.
- No waste, no water or energy consumption.

Dosage: 50 - 150 mL/hL.

Available in powder form on request, for the production of wines without sulphites.

**Clogging Index Kinetics**

Clogging index of a white wine with added 1 mL/L of **CELSTAB®**. Millipore membrane 0.65μm. The filterability of the wine returns to the initial state a few hours after treatment **CELSTAB®**.

**Sampling date**

<table>
<thead>
<tr>
<th></th>
<th>27/06</th>
<th>30/06</th>
<th>02/07</th>
<th>04/07</th>
<th>07/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANNOSTAB® LIQUIDE 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Microscopic observation of potassium bitartrate crystals evolution at -4°C in solutions with and without MANNOSTAB® LIQUIDE 200.**

**Measures taken at**

\( T = 0, T = 4 \text{ mn}, T = 1h, T = 4h, T = 24h \)

Clogging index of a white wine with added 1 mL/L of **CELSTAB®**, Millipore membrane 0.65μm. The filterability of the wine returns to the initial state a few hours after treatment **CELSTAB®**.
**POLYTARTRYL®**

**Metatartaric acid under vacumm.**
- Crystallisation inhibitor of potassium bitartrate salts.

**POLYTARTRYL® SPÉCIAL**: Index 36/38. Can be incorporated during the final filtration.

**POLYTARTRYL®**: Index 40. To be incorporated few hours before the final filtration and bottling.

**SUPER POLYTARTRYL®**: Index 40/42. The strongest index of esterification.

Maximum legal dose: 10 g/hL.

Available in powder form on request, for the production of wines without sulphites.

---

**THANKS TO ITS EXPERTISE ON COLLOIDAL STABILISATION OF POTASSIUM BITARTRATE, LAFFORT® OFFERS A SOLUTION ADAPTED TO EACH QUALITY AND CATEGORY OF WINE TO OPTIMISE TREATMENT.**

<table>
<thead>
<tr>
<th>DIT VALUE (%)</th>
<th>&gt; 20</th>
<th>&gt; 20</th>
<th>&lt; 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of wine</td>
<td>Rapid turnover.</td>
<td>Rapid turnover.</td>
<td>Premium, ageworthy wines (6 months minimum).</td>
</tr>
<tr>
<td>Calcium (mg/L)</td>
<td>&lt; 60</td>
<td>&lt; 60</td>
<td>&lt; 60</td>
</tr>
<tr>
<td>Recommended treatment</td>
<td><strong>POLYTARTRYL®</strong></td>
<td><strong>CELSTAB®</strong></td>
<td><strong>MANNOSTAB® LIQUIDE 200</strong></td>
</tr>
<tr>
<td>Treatment dose</td>
<td>10 g/hL</td>
<td>10 g/hL</td>
<td>50 - 150 mL/hL</td>
</tr>
<tr>
<td>White wines</td>
<td>Direct treatment.</td>
<td>Direct treatment.</td>
<td>Natural stabilisation of red, white and rosé wines.</td>
</tr>
<tr>
<td>Red and rosé wines</td>
<td>Direct treatment.</td>
<td>Risk of interaction with colouring material, formation of haze or precipitant.</td>
<td>Natural stabilisation of red, white and rosé wines.</td>
</tr>
</tbody>
</table>

**Degree of Tartaric Instability: DIT (%)**

- Stability threshold (white, red, rosé wines): < 5 % (under measurement conditions in our laboratory).
**PRESERVATIVES**

Refer to the local legislation in force for the maximum sulphur dioxide level in the wine.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DESCRIPTION</th>
<th>DOSAGE</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULPHUR DIOXIDE</td>
<td>Pure liquefied sulphur dioxide (under pressure).</td>
<td>Maximum dosage in wine is restricted. Check your local legislation in force and abide by the right dosage.</td>
<td>1 kg - 25 kg</td>
</tr>
<tr>
<td>BISULFITE 15</td>
<td>Aqueous solution of potassium bisulphite.</td>
<td>10 mL releases 1.5 g of SO₂.</td>
<td>1.1 kg - 5.5 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23 kg</td>
</tr>
<tr>
<td>BISULFITE 18</td>
<td>Sulphiting of wines and musts.</td>
<td>10 mL releases 1.8 g of SO₂.</td>
<td>6 kg - 25 kg</td>
</tr>
<tr>
<td>BISULFITE NH₄ 150</td>
<td>Potassium bisulphite and sulphur dioxide in aqueous solution.</td>
<td>10 mL releases 1.5 g of SO₂ and 0.4 g of diammonium.</td>
<td>11 kg - 23 kg</td>
</tr>
<tr>
<td>BISULFITE NH₄ 200</td>
<td>Sulphiting of wines and musts.</td>
<td>10 mL releases 2 g of SO₂ and 0.5 g of diammonium.</td>
<td>5.5 kg - 11 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23 kg</td>
</tr>
<tr>
<td>BISULFITE NH₄ 400</td>
<td>Concentrated aqueous solution of ammonium bisulphite.</td>
<td>10 mL releases 4 g of SO₂ and 1.07 g of diammonium.</td>
<td>25 kg</td>
</tr>
<tr>
<td>SOLUTION 6</td>
<td>Aqueous solution of ammonium bisulphite.</td>
<td>10 mL releases 0.6 g of pure SO₂.</td>
<td>5 kg - 10 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 kg</td>
</tr>
<tr>
<td>SOLUTION 10</td>
<td>Aqueous solution of ammonium bisulphite.</td>
<td>10 mL releases 1 g of pure SO₂.</td>
<td>1.1 kg - 5.5 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11 kg - 23 kg</td>
</tr>
<tr>
<td>POTASSIUM METABISULPHITE</td>
<td>Pure sulphur dioxide dissolved in water.</td>
<td>1 g of potassium metabisulphite releases 0.5 g of SO₂.</td>
<td>1 kg - 25 kg</td>
</tr>
<tr>
<td>OENOSTERYL® 2</td>
<td>Neutralised aqueous solution of sulphur dioxide.</td>
<td>Each tablet releases 2 g of SO₂.</td>
<td>Box of 48 tablets.</td>
</tr>
<tr>
<td>OENOSTERYL® 5</td>
<td>Pure potassium bisulphite in powder.</td>
<td>Each tablet releases 5 g of SO₂.</td>
<td>Box of 42 tablets.</td>
</tr>
<tr>
<td>SULPHUR TABLETS*</td>
<td>Effervescent tablets of potassium bisulphite.</td>
<td>Conservation of empty barrels: burn between 2 and 4 g/L of sulphur (repeat the operation regularly according to the storage conditions). Sulphuring after barrel cleaning: burn between 1 and 3 g/L once the barrels are drained.</td>
<td>Box of 1 kg.</td>
</tr>
</tbody>
</table>

*The production of SO₂ can vary depending on how damp the barrels are.*

**Find Out More:** Watch our OENOSTERYL® video on our website, at LAFFORT & YOU (Video).
As part of our global quality management policy, we continuously strive to meet your needs to the best of our ability. Certificates are available on the LAFFORT® website, confirming the quality of LAFFORT® products in regards to the following points.

- OMRI certificate.
- List of LAFFORT® products available for use in organic winemaking and/or the US National Organic Program’s (NOP) winemaking regulations.
- Kosher certificates.
- Vegan certificates.
- List of allergenic products.
- Packagings: contact of foodstuffs environment.
- Statement on animal welfare.

Aware of the major challenges of guaranteeing its customers the best control in terms of food safety, LAFFORT® is now ISO 22000 certified.
Copeaux & Granulars 69

Staves & Blocks 71

Barrel Refresh 73
NOBILE®

The Oenology of Wood

LAFORT’s oenological oak brand, NOBILE® offers practical and innovative solutions that reveal the full expression of your wines.

MATERIAL SELECTED

Carefully selected for their enological quality, all oak lots are “barrel quality” and are subject to strict traceability standards. Thanks to our knowledge of the aromatic potential of oak from different origins (Quercus Petraea, Quercus Robur, Quercus alba), we can select and assemble the wood in order to limit the natural variability and ensure reproducibility.

The wood have a maturation phase for a minimum period of 24 months in the open air. NOBILE® controls the maturation by monitoring the evolution of wood compounds responsible for the enological potential of each product.

PRECISION TECHNOLOGY

As a producer of wood for use in oenology, NOBILE® boasts technologically advanced production equipment.

Extremely delicate, the heating operations are carried out by hot air convection, providing homogeneously heated products from the surface through to the center, or by other specific methods for reproducing heated gradients comparable to barrel toasting. Experience and control of the release of volatile compounds from the wood, and experience and control of heating techniques can ensure aromatic and tannic reproducibility for elaborate flavor profiles.

DOSAGE & CONTACT TIME

The dosage or quantity, depending on the alternative used, must be considered and will be based on the characteristics of the wine’s style. Contact time is defined by tasting throughout ageing. For more usage tips, consult the NOBILE® team, specialising in the enology of wood.

REGULATIONS

The use of oak wood chips is subject to regulation. Refer to the legislation.
CHIPS & GRANULARS

A full range of high quality products combining tradition, expertise, innovation and research.

UNTOASTED OAK

NOBILE® FRESH GRANULAR 24M Granulars
- Antioxidant & structure.

NOBILE® AMERICAN FRESH GRANULAR Granulars
- Fruit & lactones.

TOASTED OAK

NOBILE® FRESH THERMO TRAÎTÉ Chips & Granulars
- Freshness, fruit & structure.

NOBILE® BASE Chips
- Volume & roundness. Without toasted notes.

NOBILE® SPICE Chips
- Fruity & spicy.

NOBILE® SWEET Chips & Granulars
- Vanilla & toasted.

NOBILE® SWEET VANILLA Chips & Granulars
- Naturally lush vanilla.

NOBILE® INTENSE Chips
- Volume & roasted almonds.

NOBILE® AMERICAN BLEND Chips & Granulars
- Caramel & smoky.
### AGEING OBJECTIVES

<table>
<thead>
<tr>
<th><strong>RESPECTS THE FRUIT WITHOUT TOASTED NOTES</strong></th>
<th><strong>FRESH</strong> Structure &amp; fruit</th>
<th><strong>SENSATION</strong> Vanillia &amp; toasted notes</th>
<th><strong>DULCE</strong> Sweetening, Dulce de leche &amp; caramel</th>
<th><strong>18 - XBASE</strong> Volume &amp; sweetness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AROMATIC</strong></td>
<td><strong>INTENSE</strong> Chocolate &amp; roasted notes</td>
<td><strong>18 - XTREME</strong> Roasted coffee &amp; mocha</td>
<td><strong>RÉVÉLATION</strong> Structure &amp; fruit</td>
<td><strong>ELITE</strong> Complex &amp; traditional</td>
</tr>
<tr>
<td><strong>COMPLEXITY SIMILAR TO BARREL AGEING</strong></td>
<td><strong>REVEALATION</strong> Structure &amp; fruit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### THE NOBILE® TOASTING PROCESSES

**HOMOGENEOUS TOASTING**
Toasting program dedicated to reproducing complex aromatic expression.

**GRADIENT TOASTING**
Surface heating process which creates a heating gradient identical to a traditional barrel.

**DOUBLE TOASTING**
The precise selection of oak combined with double toasting achieves a good balance between the ellagitannins and polysaccharides naturally present in oak, developing an aromatic complexity similar to barrel ageing.

**SOFT OAK**
Exclusive to the NOBILE® 18 mm range, the "Soft Oak" method is used to optimise the toasting process of the Staves. This pre-heating program contributes to the creation of unique characteristics.
### STAVES & BLOCKS

Character and complexity whilst respecting the fruit.

#### HOMOGENEOUS TOASTING

<table>
<thead>
<tr>
<th>7 MM</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESH</td>
<td>Freshness, fruit &amp; structure.</td>
<td></td>
</tr>
<tr>
<td>SENSATION</td>
<td>Sweetness, vanilla &amp; toasted.</td>
<td></td>
</tr>
<tr>
<td>INTENSE</td>
<td>Volume, roasted coffee &amp; chocolate.</td>
<td></td>
</tr>
</tbody>
</table>

#### GRADIENT TOASTING

<table>
<thead>
<tr>
<th>12 MM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RÉVÉLATION</td>
<td>Structure &amp; aromatic complexity.</td>
</tr>
<tr>
<td>AMERICAN RÉVÉLATION</td>
<td>Sweetness, spice bread &amp; lactone.</td>
</tr>
</tbody>
</table>

#### DOUBLE TOASTING

<table>
<thead>
<tr>
<th>18 MM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ELITE</td>
<td>Toasted nuances. Volume. Similar to traditional barrel ageing.</td>
</tr>
</tbody>
</table>

#### HOMOGENEOUS TOASTING

<table>
<thead>
<tr>
<th>18 MM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DULCE</td>
<td>Roundness &amp; sweetness. Dulce de leche &amp; caramel.</td>
</tr>
</tbody>
</table>

#### HOMOGENEOUS TOASTING

<table>
<thead>
<tr>
<th>18 MM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - XBASE</td>
<td>Intensity and palate weight. Fruity, without overt oak characters.</td>
</tr>
<tr>
<td>18 - XTREME</td>
<td>Expression of ripe fruit. Sweetness with mocha notes and roasted coffee.</td>
</tr>
</tbody>
</table>

#### GRADIENT TOASTING

<table>
<thead>
<tr>
<th>18 MM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - DIVINE</td>
<td>Gives texture. Extends the fruit to a complex finish (such as the elegance of Burgundian barrels).</td>
</tr>
</tbody>
</table>
OENOLOGICAL +

Innovative attachment system for ultraeasy implementation.

- 20 to 100% new oak equivalent (1 NOBILE® Barrel Refresh = ± 20% new oak).
- Maximizes the beneficial oxygen from barrels.
- Barrel preservation.

CUSTOM MADE

BARREL REFRESH SPECIAL

A custom blend of 7 & 12 mm profiles can be made to specification to achieve particular characteristics and style.

BARREL REFRESH SPECIAL 18

A custom blend of 18 mm profiles can be made to specification to achieve particular characteristics and style.

Profiles available (refer to the Staves range): FRESH, SENSATION, INTENSE, RÉVÉLATION, AMERICAN, RÉVÉLATION, ELITE, DULCE, 18-XBASE, 18-XTREME, 18-DIVINE.

OXYGEN AND OAK

During ageing, the wine needs oxygen to evolve.

Oxygen contributes to the stabilisation of colour, the softening of tannins and the integration of wood compounds. The quantity of oxygen in contact with the wine must be controlled throughout ageing, adapted to the quality of the wine, the cellaring potential or the desired consumption time after purchase.
BARREL REFRESH

Give new life to your barrels.

HOMOGENEOUS TOASTING

BARREL REFRESH SENSATION

- Sweetness, vanilla & toasted.

GRADIENT TOASTING

BARREL REFRESH RÉVÉLATION

- Structure & aromatic complexity.

HOMOGENEOUS TOASTING

18 - XBASE

- Intensity and palate weight. Fruity, without overt oak characters.

18 - XTREME

- Expression of ripe fruit. Sweetness with mocha notes and roasted coffee.

GRADIENT TOASTING

18 - DIVINE

- Gives texture. Extends the fruit to a complex finish (such as the elegance of Burgundian arrels).

Find Out More:
Watch our BARREL REFRESH video on our website, at LAFFORT & YOU (Video).
Organic certifications and wine

The products and product ranges that are usable in Organic winemaking are framed by the EU regulation n°889/2008 and its amendments and NOP (National Organic Program) of USDA (United States Department of Agriculture).

Certifications

The list of the LAFFORT® products authorized within the framework of the European Organic legislation and/or NOP is available on our website (direct access if you scan the QR code below).

We have chosen to rely on the external certification bodies Ecocert and OMRI: 7 of our products have their own certification, corresponding to Regulation (EC) No. 889/2008 and to the specific technical specifications defined by OMRI based on the NOP (National Organic Program) (www.ecocert.fr, www.omri.org, www.usda.gov).

Where to find our certificate?

Go to www.laffort.com, «download» section, «Certificates» category.

www.laffort.com/downloads/certificates

Our certificates & listed products:

ZYMAFLORE® 011 BIO
OENOCELL® BIO
OENOGOM® BIO

More than 110 products or range are listed on the website www.intrants.bio as authorised within the framework of the European Organic legislation.

SUPERSTART®
SUPERSTART® BLANC
SUPERSTART® ROUGE
OENOLEES®
Laffort® is keenly aware of the highly technical nature of producing rosé wines with numerous complex hues and aromas. Via our experimental centre and a team of dedicated staff from different specialist fields, we have expanded our expertise to offer a range of targeted products adapted for producing superior rosé wines.
Protection against oxidation
To avoid the oxidation of polyphenols into quinones and to protect aromas, it is essential to implement all available techniques: evaluation of good practices in wineries (avoid air outlets, check the gaskets fittings...), rigorous process and use of inert gases.

Refrigeration and cooling capacity
Cold conditions limit enzyme activity in terms of colour extraction and oxidation by polyphenol oxydases. It is therefore essential to work on these pre-fermentation phases as quickly as possible at low temperature.

Pressing
The objective for rosé wines that are pressed directly is fast, qualitative release of juices to obtain the best aromas without extracting colour. It is strongly recommended to use enzymes during the filling of the press.

Fermentation
The choice of yeast strain and nutrition both help direct and optimize the aromatic profile of a wine according to its objective.

Fining
Early fining of rosé wines, on must or during alcoholic fermentation, helps act on the phenolic compounds that trap aromas, and allows wine colour to develop and modify wine structure. An appropriate fining will help you produce high quality rosé wines.

Stabilisation
At the end of process, certain choices can alter the aromatic profile or colour of wines; there are stabilisation options that respect the wine.

The LAFFORT® team is available for any further information or advice. Do not hesitate to contact us!
To each rosé a specific fining...

Our expertise in the field of fining products has allowed us to select a range of products adapted to each situation, allowing you to create great rosé wines. The products can have a broader spectrum of action than the ones proposed below based on matrix’s of wines to treat. For further advice please contact your LAFFORT® supplier or agent.

### Objectives

<table>
<thead>
<tr>
<th>Controlling colour intensity and refining the wine</th>
</tr>
</thead>
</table>

### Recommendations

**POLYMUST® ORG**
Vegetal protein (pea), calcium bentonite. Effective clarification. Preserves organoleptic potential.

**POLYMUST® V**
Vegetal protein (pea), PVPP. Eliminates oxidisable phenolic compounds.

**POLYMUST® DC**
Vegetal protein (pea), calcium bentonite, active carbon. Reduces hue, Stabilises colour.

**POLYMUST® ROSÉ**
PVPP, vegetal protein (patatin, potato protein isolate). Stabilises hue, reduces phenol acids.

**VEGECOLL®**

**POLYLACT®**
PVPP, potassium, caseinate. Inhibits browning.

**MICROCOL® ALPHA**
Sodium bentonite respecting colour and aromas while also having a good protein removal capacity.

**CELSTAB®**
CMC for tartaric stabilisation, with good filterability. To be used following specific laboratory testing.

---

**STABILISATION**

**STABILITY OF WINES CAN BE USED FOR WINES 100% USABLE IN ORGANIC WINE MAKING WITHIN THE FRAMEWORK OF EUROPEAN REGULATION 889/2008.**
Our seriously rosé selection...

**OPTIMISATION PROCESS**

**LAFAZYM® PRESS & LAFAZYM® XL PRESS**
Pressing.

**LAFASE® XL CLARIFICATION**
Clarification.

**AROMATIC OPTIMISATION**

**LAFAZYM® THIOLS**
Aromatic thiols revelation – Must and wines in fermentation.

**LAFAZYM® AROM**
Terpene aroma revelation – End of AF and finished wines.

**ACTIFLORE® ROSE**

**ZYMAFLORE® X16**

**ZYMAFLORE® X5**

**ZYMAFLORE® VL1**

**ZYMAFLORE® DELTA**

**FERMENTATION AROMAS**

**YEASTS**

**SUPERSTART® BLANC & ROSE**
Yeast rehydration product with a high vitamin and mineral content for optimising yeast metabolism throughout fermentation.

**FRESHAROM®**
Specific preparation of inactivated yeasts with a high glutathione and glutathione precursor content. Preserves aroma and enhances body on the palate.

**NUTRISTART® ORG, NUTRISTART® AROM & THIAZOTE®**
Complete or purely organic nutrition to supplement nitrogen deficiencies in must.
Quality sparkling wine production follows a unique sequence of stages, which must be optimised to achieve the final desired product. LAFFORT®’s dedication to achieving excellence in this field have led us to create the LAFFORT® SPARK range. A highly specific range of products best suited for each stage of both traditional sparkling wines and sparkling wines in closed tanks.
For each base wine a specific strategy

**JUICE CLARIFICATION**

**LAFAZYM® CL & LAFAZYM® 600 XL**

Purified pectolytic enzymes for quick must settling.
Quick and complete depectinisation.

**FINING & COLOUR OF MUSTS**

- **Cuvée / Free run juice**
  - **POLYMUST® PRESS**
    - Removes the oxidisable and oxidized phenolics.

- **Taille / Press juice**
  - **CHARBON ACTIF PLUS GR**
    - Selected activated carbon to decolourise tinted juice.

**MALOLACTIC FERMENTATION STRATEGY**

**LACTOENOS® B16 STANDARD KIT**

*OEnococcus oeni* strain selected for low pH base wines.
Very resistant strain particularly adapted to low pH levels found in base wines. Pre-acclimatisation is achieved in the cellar (Step by step protocol. See technical tools).

**TARTARIC STABILISATION**

**CELSTAB®**

Solution of cellulose gum. CELSTAB® is a highly purified cellulose polymer of vegetal origin, with a low degree of polymerisation and viscosity.
The liquid (10% solution) formula makes it easy to incorporate into the base wine.

*Under traditional method, the addition is made entirely before tirage.*

---

The LAFFORT® team is at your disposal for any information. Do not hesitate to contact us!

**TECHNICAL TOOLS**

- Implementation of MLF starter.
- Implementation of yeast starter for secondary fermentation.
- Preparation of tirage mixture.
**Traditional method**

Elegance, finesse, complexity

---

**SUPERSTART® spark**

Yeast rehydration preparation adapted to sparkling wine conditions (Patent FR2736651).
Combination of growth and survival factors to ensure a complete “prise de mousse”.

**ZYMAFLORE® spark**

Yeast recommended for fine, elegant and full sparkling wines.
Develops tertiary aromas for fine, complex and elegant sparkling wines.

*Tested and validated by the microbiological laboratory of the CIVC (Comité interprofessionnel des vins de Champagne).*

**CLEANspark**

Riddling adjuvant (bentonite/alginate).
Quick and complete removal of particles and sediments in bottles after ageing “sur lattes” (on lees).

**TANspark**

Combination of gallic and ellagic tannins in liquid form.
Rebalances redox potential of the base wine, reinforces its structure and confers shininess to the finished sparkling wine.
**Superstart® Spark**
Yeast rehydration nutrient designed to adapt the active dry yeast to sparkling wines conditions (Patent FR2736651).
Combination of growth and survival factors to ensure a complete “prise de mousse”.

**Zymaflore® X5**
Yeast selected for fresh and aromatic wines.
High production of varietal and secondary aromas (boxwood, grapefruit, exotic fruits).

**Zymaflore® X16**
Yeast for aromatic and modern sparkling wines.
High production of secondary aromas (white peach, white flowers, yellow fruits).

**Fresharom®**
Specific preparation of inactivated yeast with high protective power (5.3%).
Allows for increased aromatics, as well a better ageing potential in sparkling wines.
Participates actively to the bubble finesse and foam persistence. Addition at tirage.

**Yeasts selected for their ability to achieve secondary fermentation.**
The robustness of certain yeasts to “prise de mousse” used to be based on empirical criteria. However, this is now explained by the presence of several genetical markers (QTL) that determine their resistance to low pH (<2.8) and high pressures (Marti-Raga, 2017).
Quality of bubbles
The quality of the foam is essential for customer satisfaction

OENOLEES®
Accelerates the development of “on lees” ageing characters.
Optimises foam finesse and persistence.

MANNOSTAB® LIQUIDE 200
Specific yeast cell walls mannoproteins. (Patent 2726284).
Reinforces tartaric stabilisation.
Enables to restore foam finesse and persistence.

OENOLEES® MP
Specific preparation of yeast cell wall extract (Mannoproteins), rich in sapid peptide content and polysaccharides (Patent EP 1850682).
Enables to significantly lower the quantity of liqueur.
Allows the winemaker to delicately balance both acidity and bitterness.
Actively participates in restitution of the foaming properties of the sparkling wines.
In partnership with research institutions since 1991

> Collaboration with respected research centres throughout the world.
> Internal R&D projects supported by a multidisciplinary team.
> Two experimental winemaking centres to test research results under rigorous practical conditions.

A unique expertise in oenology

> An integrated approach to microbial biodiversity.
> Original approaches to microorganism selection: determination of QTLs, intra- and inter-specific crosses, mass selection targeting innovative criteria.
> Innovative tools for developing yeast derivative products and their application in oenology.
> Molecular identification of the aromas responsible for the typical characters of wines and the macromolecules, tannins, proteins, polysaccharides that affect their quality.

Exploiting and adding value to the research results

> More than 25 employees in R&D, 10 of them permanent.
> More than 30 theses funded around the world, more than a hundred papers published.
> 19 patents to add value to the know-how resulting from this work.
> Innovative products oriented towards sustainable oenology.
OTHER RANGES

89 Cleaning product
APPENDIX

88  Fermentation restart protocol
90  MLF restart protocol
92  Flotation protocol with VEGECOLL®
94  Tools for acidification of musts and wines
96  Microbiological protocol
98  Kosher passover product list
Regeneration and unclogging of filter membrane units.

Aiming to support our partners during all steps of winemaking, LAFFORT® offers a new range of cleaning products, specially developed to regenerate and unclog the filter membrane units. Based on an enzymatic technology, it allows a more efficient cleaning of tangential filters and filter cartridges.

**DECAPOL® EXTRA Life**
Enzymatic detergent created to decompose organic residues in filtering systems (tangential filters and filter cartridges).

- Free of phosphate and surfactants (can be directly applied to filter cartridges).
- Strong oxydiser.
- Proper for everyday use or for unclogging programs.
- Used in a closed circuit or CIP.
Dosage: consult product packaging.

**DECAPOL® DEEP Clean**
Enzymatic detergent created to decompose organic residues in filtering systems (tangential filters).

- Moderate oxydiser.
- Proper for everyday use or for unclogging programs.
- Specific for cleaning tangential filters.
- Used in a closed circuit or CIP.
Dosage: consult product packaging.

**DECAPOL® STONE Clear**
Specific formula recommended to treating mineral based clogging (silica, copper, iron, calcium...).

- Formula concentrated in dispersing and chelating agents.
- Can be used along with other products from the range.
- Used in a closed circuit or CIP.
Dosage: consult product packaging.
Fermentation restart protocol
Alcoholic fermentation

For 100 hL of stuck wine:

1. PRELIMINARY OPERATION ON STUCK WINE
   - Rack/centrifuge avoiding air.
   - Adjust wine temperature to 20°C.
   - Adjust SO₂ at 1-2 g/hL (10-20 ppm).
   - Add:
     - For white wines: BI-ACTIV® 30 g/hL (300 ppm).
     - For red wines: OENOCELL® 20 - 40 g/hL (200 - 400 ppm).
   - Mix wine anaerobically every 12 hours for 24 hours.
   - Move on to step 2.

2. PREPARATION OF THE YEAST INOCULUM
   2.1. PREPARATION OF THE WINE FOR THE YEAST INOCULUM
      - Take 5% of the volume of the treated stuck wine from step 1.
      - Adjust the alcohol to 8%, the sugar content to 20 g/L and the temperature to 20°C.
      - Add THIAZOTE® PH: 40 g/hL (400 ppm) corresponding to 10% of the total stuck wine.

2.2. YEAST PREPARATION
      - Water 60 L at 40°C.
      - Add the yeast rehydration nutrient SUPERSTART® SPARK: 3 kg (30 g/hL - 300 ppm), then homogenise.
      - Add ACTIFLORE® B0213 (30 g/hL - 300 ppm).
      - Wait 20 minutes, homogenise.
      - Add immediately 20 L of treated wine from step 2-1.
      - Wait 10 minutes, let cool to 20°C and maintain the temperature between 20 - 25°C.
      - The total time of the yeast rehydration must not exceed 45 minutes.

*Check with a thermometer.
2.3. Acclimatation of the yeast preparation

- Add the yeast preparation (Step 2.2) to the prepared wine for the yeast inoculum (Step 2.1), and maintain the temperature around 20°C.
- Measure the Brix and maintain the inoculum at 20°C with aeration until 0.5°Brix (avoid the total exhaustion of sugars in the inoculum and a fall in the yeast activity). Aerate as soon as AF starts.
- Double the volume with treated wine (Step 1) at 20°C.
- Measure the Brix and maintain again the inoculum at 20°C until 0.5°Brix. Aerate again when fermentation becomes active.

Incoroporation of yeast inoculum in the tank

3. Incorporation of yeast inoculum in the tank

- Add the yeast inoculum to the treated wine (Step 1), maintain at 20°C.
- Add 30 g/hL (300 ppm) of NUTRISTART® ORG to the total volume of the tank to the treated wine (Step 1).
Problems regarding malolactic fermentation (MLF) in wine can have different origins:

- Competition from residual yeasts.
- Wine toxicity: the presence of inhibiting compounds (ethanol, SO₂, medium-chain fatty acids).
- Bacterial deficiency.
- Low level of nutrients necessary for the bacteria.

*For each of these situations, there is a specific protocol:*

1. **Decrease competition with residual yeasts:**
   
   In order to eliminate the yeasts, there are different techniques such as racking, filtration (1 μm) or flash-pasteurisation. In all cases, once the yeasts are eliminated, it is important to add the selected bacteria early in order to rapidly colonise the wine.

2. **Detoxify the medium:**
   
   To eliminate the molecules inhibiting lactic acid bacteria, yeast hull addition (OENOCELL® 20 to 40 g/hL) during an anaerobic circulation is the most efficient treatment. This must be done 24 to 48 hours before the bacterial addition, mixing continuously if possible, in order to optimise their survival rate.

3. **Use a reliable bacteria preparation:**
   
   Bacterial strains have different levels of resistance to difficult wine conditions depending on their individual genetic profiles. LACTOENOS® B16 STANDARD is one of the strongest strains available, especially for its resistance to medium-chain fatty acids.

4. **Activate the bacteria:**
   
   When the wine has a notably low nutrient content, MALOSTART® addition is recommended after the bacterial inoculation to provide essential nutrients for increased malolactic activity.
Malolactic fermentation restart protocol

All aforementioned situations are linked: when residual yeasts are active after primary fermentation (*Saccharomyces* or *Brettanomyces*), they tend to consume any remaining nutrients and produce compounds toxic to bacteria. An efficient restart MLF protocol will therefore combine the following strategies.

**Protocol for MLF restart**

1. **Rack/centrifuge anaerobically.**
   
   Note: if *Brettanomyces* population is higher than $10^3$ cell/mL, filter the wine (1 μm).

2. **Incorporate OENOCELL® (20 to 40 g/hL).**
   
   Mix wine anaerobically every 12 hours for 48 hours, or continuously if possible.

3. **Inoculate with LACTOENOS® B16 STANDARD.**
   
   (Follow the specific protocol indicated on the packaging).

4. **Add MALOSTART® (20 to 40 g/hL).**
   
   Homogenise anaerobically.

**Important:** maintain a stable temperature, between 18°C - 25°C, during all stages and until the end of MLF.
Flotation protocol with VEGECOLL®

Many factors influence the flotation process and hence its success. The parameters of the protocol have been specially adapted for an easy flotation. Do not hesitate to contact LAFFORT®’s team before your flotation trials in order to explore the potentially inhibiting parameters and find the appropriate solutions.

1. **Preparing of the juice**
   - Clarification by flotation involves migration of the particles of the must to the surface of the tank. This migration is prevented in the presence of pectins. The addition of pectolytic enzyme directly after grape pressing is necessary to accelerate the process.
     - LAFASE® XL CLARIFICATION - 2 to 3 mL/hL.
     - LAFAZYM® 600XL ICE (allows complete depectinisation at low temperatures) 1 to 2 mL/hL.
   - In the case of must particularly difficult to clarify (variety, maturity...) or to accelerate the depectinisation the use of LAFASE® BOOST at 1 mL/hL is recommended.
   - Check the completion of the depectinisation before starting the flotation. Use our Pectin Test.

2. **Connecting the flotation pump**
   - For an easy flotation, the filling of the tank should not exceed 85 to 90% of the total volume.
   - The temperature of the must should be between 15 and 18°C. The colder the must, the higher the viscosity, the more difficult the flotation process.
   - Connect the pump inflow to lees valve, and the pump outflow to racking valve.
   - For the best results, pipes should not exceed 3 m (inflow and outflow).
   - Make sure all the air is out of the saturation column before closing the tap.

3. **Adding the VEGECOLL®**
   - Start the pump without gas injection.
   - Check that the saturation pressure is between 2 and 3 bar (the size of the tank does not matter).
   - Prepare VEGECOLL® in a clean, inert container following LAFFORT® recommendations or use VEGECOLL® liquid. The recommended dose of VEGECOLL® is usually 5 g/hL. (the dose can be adjusted according to the characteristics of the must).
   - Place into the VEGECOLL® preparation, the pipe dedicated to the venturi suction provided on the flotation system.
   - Inject VEGECOLL® as slowly as possible.
   - Mix the tank for 20 to 25 minutes at a saturation pressure of 2 to 3 bar, without addition of gas.
4 STARTING THE FLOTATION PROCESS

- Once the tank is homogenized, open the gas injection valve.
- The nitrogen inlet pressure should be between 5 and 7 bar.
- The gas flow rate must be between 25 - 40 L/min (depending on flotation setup). The saturation pressure must be adjusted to 5 bar.
- Check the quality of the flotation. To do this, take a sample at the tap of the saturation column.
- Remember to readjust the saturation pressure between 5 and 7 bar after sampling.
- The circulation time for flotation is between 60 - 150 min. Depending on the volume of the tank.
- Pump the equivalent of 1 to 2 volumes of the tank - 1.5 times is usually enough.

5 COMPLETION OF FLOTATION PROCESS AND WAITING TIME

- Once the flotation process is complete, stop the pump.
- Close the gas.
- Close all the valves in the tank.
- Leave the tank for 60 to 120 minutes so that lees can rise to the surface.
- Do not leave the tank longer than 240 minutes. Gravitational force can cause lies separation and resuspension of the lees if the waiting time is too long.
- Check the turbidity of the clarified batch.

Find Out More: Discover our FLOTTATION video on our website, at LAFFORT & YOU (Video).
Three acids are authorised for acidifying musts and wines:
- Tartaric acid (L(+)-tartaric).
- Malic acid (L-Malic – D,L-Malic).
- Lactic acid (DL-Lactic).

These acids are naturally present in grapes. They differ in structure, acidification capacity and organoleptic impact. Operations can consist of a mix of additions of different acids (especially appropriate on wines for organoleptic purposes).

The goals pursued must be the object of prior testing. Variations in pH and total acidity for the same treatment are not the same, the ionic strength and the buffering capacities can have a significant influence from one must or wine to another.

**REGULATORY STANDPOINT**

EC regulation 606/2009 (Appendix IA, point 12) allows the possibility of using tartaric acid, malic acid and lactic acid for acidification purpose in musts and wines.

**Acidification of musts and new wines in fermentation:**
Maximum dosage 1.5 g/L expressed in tartaric acid i.e. 20 meq/L (1.0 g/L expressed in H₂SO₄). Treatment in one single operation.

**Acidification of wines:**
Maximum dosage 2.5 g/L expressed in tartaric acid i.e. 33.3 meq/L (1.6 g/L expressed in H₂SO₄). Treatment in several operations within the legal limit, solely on the site of the vinification company and in the wine growing zone where the grapes involved in making the wine in question have been harvested.

**All treatments will be entered into a handling register and a custody register.**

Acidification and enrichment (or chaptalisation) of one and the same product are mutually exclusive processes (for example a must or new wine still in fermentation can be enriched or chaptalised and the wine from the fermentation can be acidified), except by way of derogation (Appendix V § C point 7).

---

**Tools for acidification in musts and wines**

<table>
<thead>
<tr>
<th>Acid</th>
<th>Acid intensity</th>
<th>Persistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tartaric acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citric acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malic acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactic acid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lactic: soft, balanced.
Tartaric: lively, immediate.
Malic: sharp, less immediate.
**SUMMARY OF THE COMMERCIAL PRODUCTS AVAILABLE AND THEIR PRINCIPAL OENOLOGICAL CHARACTERISTICS.**

<table>
<thead>
<tr>
<th></th>
<th>TARTARIC ACID</th>
<th>MALIC ACID</th>
<th>LACTIC ACID</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chemical formula</strong></td>
<td>C\textsubscript{4}H\textsubscript{6}O\textsubscript{6} E334 L</td>
<td>C\textsubscript{4}H\textsubscript{6}O\textsubscript{5} E296 DL/L</td>
<td>C\textsubscript{4}H\textsubscript{6}O\textsubscript{5} E270 DL</td>
<td>Malic and lactic acids are achiral molecules. They exist in the form of two enantiomers: L and D form. Only the L form of malic acid exists naturally in grapes. Lactic acid is a natural result of lactic bacteria metabolism produced by the latter only in the L form when they consume malic acid, and in a mix of L and D form when they consume sugars.</td>
</tr>
<tr>
<td><strong>pKa</strong></td>
<td>3.05 / 4.2 Di-acid</td>
<td>3.4 / 5.1 Di-acid</td>
<td>3.85 Mono-acid</td>
<td>The acids are classified according to their pKa (acidity constant). The higher the pKa, the weaker the acid.</td>
</tr>
<tr>
<td><strong>Correspondence 1 Eq.</strong></td>
<td>75 g</td>
<td>67 g</td>
<td>90 g</td>
<td></td>
</tr>
<tr>
<td><strong>Recommended targets.</strong></td>
<td>Red – Rosé White</td>
<td>White – Rosé</td>
<td>Red – Rosé White</td>
<td></td>
</tr>
<tr>
<td><strong>Treatment on must (at 20 meq/L).</strong></td>
<td>1.50 g/L</td>
<td>1.34 g/L</td>
<td>1.80 g/L</td>
<td></td>
</tr>
<tr>
<td><strong>Treatment on wine (at 33 meq/L).</strong></td>
<td>2.5 g/L</td>
<td>2.23 g/L</td>
<td>3.00 g/L</td>
<td></td>
</tr>
<tr>
<td><strong>Effect on pH.</strong></td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>Tartaric acid remains the most effective on pH. To avoid an excessive precipitation of salts, it is recommended to use it during fermentation on must.</td>
</tr>
<tr>
<td><strong>Effect on total acidity.</strong></td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>Potassium or calcium salts from malic and lactic acids are significantly more soluble than tartaric acid salts, the risk of precipitation is thus lower.</td>
</tr>
<tr>
<td><strong>Chemical stability.</strong></td>
<td>- (potassium bitartrate precipitation)</td>
<td>+++</td>
<td>+++</td>
<td></td>
</tr>
<tr>
<td><strong>Microbiological stability.</strong></td>
<td>+ Only risk is acetic acid degradation (tourne disease) by certain lactic bacteria.</td>
<td>---</td>
<td>-</td>
<td>Malic and lactic acids interact with the bacteria metabolisms. However, increased control over MLF (usage of selected bacterial starters) and good hygiene regulations significantly reduce the risks of alterations.</td>
</tr>
<tr>
<td><strong>Formulation</strong></td>
<td>Powder</td>
<td>Powder</td>
<td>Liquid</td>
<td></td>
</tr>
</tbody>
</table>

**LAFORT & YOU**

95
Microbiological protocol

Quick microbiological protocol for filtration analysis on gelose medium

Equipment preparation

- Clean and sterilize with alcohol the working table (preferably made of glass).
- Clean and sterilize filtration equipment with alcohol.
- Homogenize the sample by turning it upside down.
- Identify Petri plates (germ/batch/reading date...).
- Prepare the side equipment (filtration membranes, pliers, sterile disposable pipettes...).

Filtration

In order to have a good idea of the population, we suggest to make 2 routine filtrations, one with 100mL of wine, the other with 10 mL. Make your experiments close to the Busen burner. (15 - 20 cm away from the burner).

100 mL
- First pour distilled water then the 100 μL of wine in order to have a correct repartition of the wine sample on the whole membrane surface.

Necessary equipment:
Sterile membranes: diameter 47 mm and porosity 0.45 μm.
Sterile distilled water.
1 mL sterile pipette.

10 mL
- Pour directly the volume of wine on the membrane.

Necessary equipment:
Sterile membranes: diameter 47 mm and porosity 0.45 μm.
10 mL sterile pipettes.
Incubation
Culture conditions must be adapted according to the microorganisms we want to count.

- Turn the plate upside down
- Incubator at 25°C
- Incubate the plate upside down

* Necessary equipment for anaerobiosis:
  - Anaerobic jar +
  - Anaerobiosis kit + indicators of anaerobiosis.

<table>
<thead>
<tr>
<th>Selective culture medium</th>
<th>Incubation time at 25°C</th>
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<tbody>
<tr>
<td>MIL-LEV</td>
<td>2 days</td>
</tr>
<tr>
<td>MIL-LM</td>
<td>2 - 5 days</td>
</tr>
<tr>
<td>MIL-BRETT</td>
<td>7 days</td>
</tr>
<tr>
<td>MIL-BA</td>
<td>6 days</td>
</tr>
<tr>
<td>MIL-BT</td>
<td>12 days</td>
</tr>
<tr>
<td>MIL-BL</td>
<td>12 days under anaerobiosis condition*</td>
</tr>
<tr>
<td>MIL-FT</td>
<td>12 days</td>
</tr>
</tbody>
</table>

Counting
Counting example on MIL-BRETT:

100 mL
Calculation detail:
2 CFU* in 100 μL = 20 CFU* in 1 mL.

\[ 2 \times 10^1 \text{ CFU*/mL} \]

Final result: arithmetic average of both dilutions.
1,75 \times 10^1 \text{ CFU*/mL}

Colonies Forming Unit

10 mL
Calculation detail:
150 CFU* in 10 mL = 15 CFU* in 1 mL.

\[ 1,5 \times 10^1 \text{ CFU*/mL} \]
Kosher Passover Products

Please contact us for availability of KP products listed above. Before using the product, please confirm with your Rabbinate’s that the Kosher certificates available in our website download area are correct. Certificates are available for download before each delivery as stock lots and certificates evolve each year.

What is the difference between kosher and kosher for passover?

The Kosher certification allows wine consumption throughout most of the year; the Kosher for Passover certification enables the consumption of wine during the Passover holiday as well as throughout the year.

* Yeast, nutrients, tannins, enzymes: available depending on stocks.
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<td>Zymaflore® XPure</td>
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Decision support tools to assist you in various stages of winemaking and ageing.

**NEW**

**Calculation of active SO₂ and adjustment of free SO₂**

Calculate the active SO₂ in your wine, taking account of its physicochemical parameters.

**Yeast nutrition: nitrogen adjustment**

Calculate organic and/or inorganic nitrogen additions to allow complete alcoholic fermentations, expressing the character of the harvest.

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**Unit converter**

Temperature, total acidity, mass, volume, density, flow rate, pressure... Select the unit to be converted and obtain the equivalent in the required unit of measurement.

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**Restarting fermentation**

A customised DST to facilitate the implementation of a starter culture to restart a stuck fermentation.

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