Gold & Silver Tiered Analysis
Full Guidance Document

Campden Wine Services has recently expanded its package offerings to ensure we continue to deliver the best value and most appropriate analytical solutions for your winemaking needs. This document explains our Gold and Silver tier analysis packages, helping you choose the right category of analysis for your requirements.

Gold Tier

The Gold tier includes our best-practice, internationally recognised reference methods, developed and maintained in consultation with our partner, the Australian Wine Research Institute (AWRI). These methods offer the highest accuracy and precision and are suitable for regulatory, labelling, compliance and export purposes.

Silver Tier

The Silver tier combines selected reference methods with the use of our WineScan FTIR where appropriate, providing a more rapid and cost-effective option. While slightly less accurate and precise than Gold tier methods, Silver tier analysis remains robust and reliable for routine monitoring and winemaking decision-making.

Winescan FTIR

The FOSS WineScan uses Fourier Transform Infrared (FTIR) spectroscopy to rapidly measure the mid-infrared spectra of wine samples. Chemometric models are then applied to accurately quantify key analytes with speed and efficiency.

Calibration:

WineScan FTIR chemometric models are calibrated using results generated from our internationally recognised Gold tier reference methods, as outlined below:

Chemometric Model	Reference Method
ABV	Anton Paar NIR Alcolyzer 3001
Density	Anton Paar DMA 4501
pH	Metrohm pH Electrode
Titratable Acidity to pH 7.0	Metrohm Autotitrator
Residual Sugar	Enzymatic via Thermo Fisher Gallery Plus Discrete Analyser
Volatile Acidity	Enzymatic via Thermo Fisher Gallery Plus Discrete Analyser
Malic Acid	Enzymatic via Thermo Fisher Gallery Plus Discrete Analyser

Chemometric calibration models are regularly updated using slope and bias adjustments derived from cross-comparisons of real samples analysed within the Campden Wine Services laboratory. This ensures models remain fit for purpose, accounting for changes in instrumentation and sample matrices.

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Quality Assurance

At Campden Wine Services, quality assurance underpins everything we do, ensuring you can have confidence in your results and make informed winemaking decisions.

Our WineScan analysis follows the same rigorous standards as our reference methods:

Instrument Zeroing:
The WineScan is zeroed at the start of each day and every hour thereafter, ensuring a correct baseline and early detection of any instrument issues.

Sample Preparation:

- Samples are equilibrated to 16 – 24 °C, using a water bath if required.
- Turbid samples are centrifuged and filtered prior to analysis.
- Samples with high dissolved CO_2 are degassed.
- All samples are analysed as soon as possible and fitted with evaporation caps to prevent loss of volatiles (e.g. alcohol).

Replicate Analysis:
All samples are analysed in duplicate, with the mean value reported. If replicate variability exceeds acceptable limits (e.g. due to gas bubbles or cleaning issues), results are rejected and the sample(s) re-analysed.

Bracketing Quality Control:
A pilot wine of known composition is run as a bracketing QC sample in each batch. This confirms batch validity, detects drift, and protects against undetected failures.

Standardisation:
The WineScan is standardised fortnightly using a FOSS FTIR Equaliser solution. The instrument compares the measured spectrum against an internally stored reference spectrum, applying corrections if wavelength or intensity drift are detected (e.g. from variation of the IR source and laser intensity, or from increased cuvette pathlength).

Servicing & Maintenance

Routine Internal Maintenance:
Performed daily, weekly, and monthly, including inline filter replacement, peristaltic pump tubing checks (and replacement if required), cleaning and soaking procedures, and database backups.

Preventive Maintenance:
A full preventive maintenance service is carried out every six months by an authorised FOSS service engineer. This prevents drift, wear, and degradation of critical parts and ensures consistent, repeatable performance over time within manufacturer specifications.

Cuvette Management:
The FTIR cuvette is made of calcium fluoride, which is known for its excellent optical properties and transmittance of infrared light. However, calcium fluoride slowly dissolves in aqueous

solutions and thus the cuvette degrades over time. Cuvette pathlength is monitored via the FOSS Integrator software and replaced when it reaches 80 % of original pathlength, or at least annually.

Limitations of FTIR Analysis:

While FTIR is a powerful and rapid analytical tool, it has known limitations:

- **CO_2 Sensitivity:**
  FTIR is sensitive to dissolved CO_2, which absorbs strongly in the mid-infrared region. Samples containing > 1.5 g/L dissolved CO_2 must be degassed via gravity filtration. Vacuum degassing is not suitable due to potential alcohol loss.
- **Low Concentration Limitations:**
  FTIR has reduced accuracy at low analyte concentrations, including:
  - Acetic acid < 0.10 g/L
  - Residual sugar < 3 g/L
  - L-malic acid < 1 g/L

For accurate results below these thresholds, Gold tier reference methods are recommended.

Gold vs. Silver: When to Use Each Tier

Analysis Requirement	Gold	Silver
Monitoring through production	✓	✓
Winemaking decisions	✓	✓
Labelling requirements (e.g. label alcohol)	✓	✓* ✗
Regulatory compliance	✓	✗
PDO/PGI	✓	✗
Confirming dryness (residual sugar)	✓	✗
Confirming completion of malolactic fermentation	✓	✗

**Post bottling still or post disgorgement silver packages only.*

Working Ranges & Measurement Uncertainty

FTIR methods have narrower working ranges and higher measurement uncertainty compared to Gold tier reference methods.

Measurement uncertainties are reported at 95 % confidence intervals.

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Analyte & Method	Working Range	Estimated Measurement Uncertainty
ABV - NIR Alcolyzer	0.5 – 20.0 % v/v	± 0.10 % v/v
ABV – Distillation Densitometry	> 0.20 % v/v	± 0.20 % v/v
ABV – GC-FID	0.01 – 0.50 % v/v	± 0.01 % v/v
ABV - FTIR	8.00 – 17.00 % v/v	± 0.25 % v/v
Density – Density Meter	0 – 2 g/cm^3	± 0.0005 g/cm^3
Density - FTIR	0.99 – 1.06 g/cm^3	± 0.0010 g/cm^3
pH – Electrode	0 - 14	± 0.05
pH – FTIR	2.8 – 4.0	± 0.10
Titratable Acidity - Autotitrator	0 – 40 g/L	± 0.10 g/L
Titratable Acidity - FTIR	2 – 20 g/L	± 0.30 g/L
Residual Sugar – Enzymatic	0.02– 2.00 g/L 2.00 – 200 g/L	± 0.15 g/L ± 10 %
Residual Sugar – FTIR	3 – 200 g/L	± 15 %
Volatile Acidity – Enzymatic	0.02 – 1.00 g/L 1.00 – 3.00 g/L	± 0.06 g/L ± 10 %
Volatile Acidity – FTIR	0.10 – 1.50 g/L	± 0.10 g/L
Malic Acid – Enzymatic	0.01 – 0.50 g/L 0.50 – 10.00 g/L	± 0.05 g/L ± 10 %
Malic Acid - FTIR	1.00 – 5.00 g/L	± 0.35 g/L

Conclusion

Campden Wine Services' Gold and Silver tier packages provide flexible, reliable analytical solutions to meet the diverse needs of winemakers.

- Gold tier delivers internationally recognised reference methods offering the highest accuracy and precision, suitable for regulatory compliance, labelling, PDO/PGI verification, exports, and any analysis where maximum confidence is essential.
- Silver tier combines selected reference methods with the WineScan FTIR, providing a faster, cost-effective option for routine monitoring and day-to-day winemaking decisions.

Both tiers are supported by rigorous quality assurance, calibration, maintenance, and preventive service protocols, ensuring confidence in the results you rely on to make informed decisions.

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By choosing the appropriate tier for your requirements, you can balance speed, cost, and analytical precision, while benefiting from Campden Wine Services' expertise and commitment to high-quality, consistent, and actionable analytical data.

For further guidance on selecting the right package or for further assistance, please contact **wines@campdenbri.co.uk**.