



Colour Measurement Fuels & Waxes

Fuel Oils & Lubricants

White Oils & Waxes

Petrochemicals

Transparent Liquids

ASTM Color

Saybolt Color

Pt-Co/Hazen/APHA Colour

Gardner Colour

Lovibond® RYBN

IP Units

Dyed Aviation

Gasolene

CIE Values

Spectral Data

Colorimetric

Chemical

Analysis

Includes tests to determine:

acid wash colour

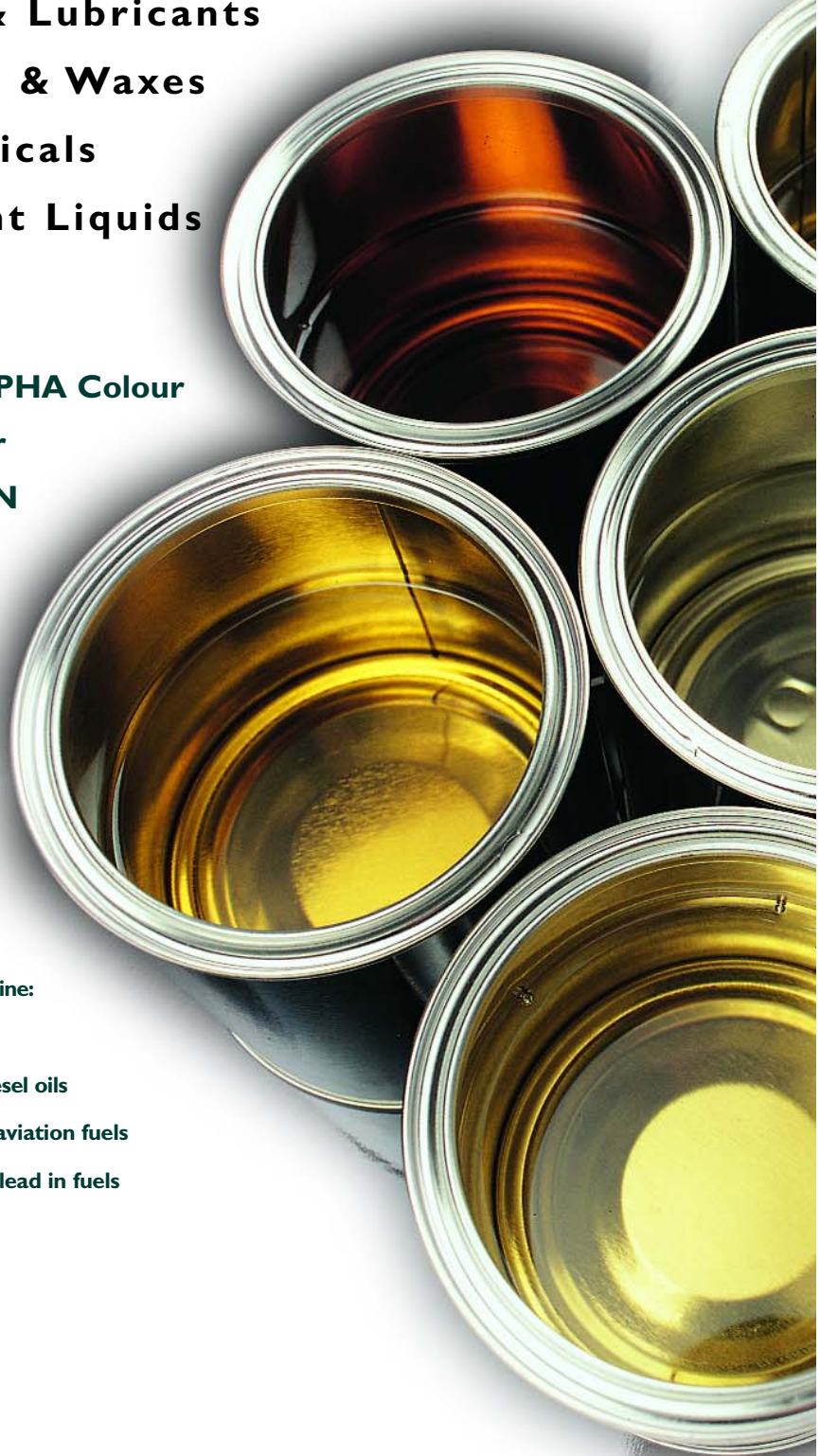
insolubles content in diesel oils

% anti-icing additive in aviation fuels

trace concentrations of lead in fuels

% marker in diesel fuels

impurities in acetone



Contents

- 3 **Tintometer**
- 4 **Why Measure Colour?**
- 4 **The Colour Scales**
- 5 **Lovibond® Instrument Selection Guide**
- 6/7 **Lovibond® PFX995/P, PFX950/P, PFX880/P
& PFX880/IP17 Petrochemical Tintometers®**
- 8 **Lovibond® PFX195 Automatic Colorimeters**
- 9 **Lovibond® Tintometer® Model F**
- 9 **Lovibond® Petroleum Oils Comparator**
- 9 **Lovibond® Gardner Comparator 3000**
- 9/10 **Lovibond® Comparator System 2000**
- 10 **Colorimetric Chemical Analysis**
- 11 **Accessories**
- Colorimetry Cells**
- Conformance Filter Sets**
- Certified Colour Reference Standards**



Tintometer

Over a Century of Excellence in Colour Measurement



In the 1800s, Joseph Lovibond, the founder of The Tintometer Ltd, developed the original Lovibond® Colour Scale, which was based on a calibrated series of red, yellow and blue glasses. Today companies throughout the world use Lovibond® colorimeters in the analysis of products such as fuel oils, lubricants, white oils, waxes and petrochemicals. Over the years the Lovibond® brand has become the hallmark for colour measurement in refining

industries, recognised by major international standardising bodies, including the ASTM, ISO and IP, who quote our equipment in their specifications for colour measurement. Tintometer's unparalleled knowledge is embodied into the Lovibond® range of instruments, from the visual comparators for single-scale colour grading through to flexible, full-scale spectrophotometric instruments for objective measurement and data analysis. And it is this unique experience that ensures excellent correlation with visual grading instruments.

Visual Measurement with Lovibond® Glass Colour Standards

After more than a century, Tintometer still manufactures and accurately grades the glass standards used for visual colour measurement in terms of ASTM Colour as well as many other established colour scales. Each Lovibond® colour standard is made from stable-coloured glass that is guaranteed not to fade during normal usage. They form an integral part of Lovibond® visual colorimeters, which enable operators to make a quick comparison between the sample and a suitable range of colour standards under specified conditions. For specific colour control requirements Tintometer can also manufacture customised glass filters, which are matched to samples provided, usually representing the 'ideal' colour and acceptable colour limits or a series of product related colours.

Automatic Measurement offering Advanced Features

Lovibond® spectrophotometric colorimeters respond to the growing demand for consistent and reliable colour data, from R&D through to processing and production. They remove all subjectivity involved in colour measurement, supplying unbiased readings which are unaffected by operator or environment. Each instrument expresses colour data in terms of industry scales, spectral data and CIE values. They offer facilities for automated data logging and analysis, they will interface with standard printers and they also include diagnostic tests for periodic checks on performance. For regular conformance testing each automatic colorimeter is supplied with a certified glass filter of specified colour value. Conformance filter sets for the principal colour scales are also available.

Quality Assured

All Lovibond® equipment can be issued with a Certificate of Conformity, which confirms that the product has been manufactured, inspected and tested under the control of our ISO 9001: 2000 Quality Management System and conforms in all respects with the stated standard or test method. In addition, Tintometer has been awarded UKAS (United Kingdom Accreditation Service) accreditation as one of an elite group of calibration laboratories for: spectral transmittance and absorbance from 380 nm to 780 nm, CIE colorimetric data (X, Y, Z, x, y, L*a*b*) ASTM Color, Gardner Colour, Saybolt Colour and UCS Judd rgb. As a result, we are now able to supply glass filters and liquid colour reference materials for Lovibond® instruments with colour measurements that are directly traceable to national standards.



Q852



Q630

Why Measure Colour?

The colour of mineral oils and fuels acts as an important indicator of product quality and processing performance throughout the industry. Specifically, colour is used in:

Quality Control

- A quick check on contamination or degradation
- An indication of suitability for a particular purpose
- As a guide to the condition of used product

Refining

- As a measure of progress in refining and processing
- Feedback for process control and optimisation
- Identification of product grade

Materials Sourcing

- An immediate guide to supply continuity

Inspection of Incoming Materials

- Assurance that materials meet colour specifications

Production Control

- A check for consistency within and across batches

Inspection of Final Products

- Conformance to predetermined colour tolerances
- Compliance with customer specifications



The Colour Scales

Grading techniques are widely used to assess product colour by comparison with a representative series of fixed colour standards. For many product types, a characteristic set of standards was agreed and adopted long ago to aid colour control and the communication of colour specifications; the result is a series of traditional colour grading scales that have been adopted as industry standards and are still in common use today.

Colour Scale	References	Scope	Range
APHA Colour, see Platinum-Cobalt			
ASTM Color	ASTM D 1500, ISO 2049 ASTM D 6045, JIS K 2580	A wide range of petroleum products including lubricating oils, heating oils and diesel fuel oils.	0.5 - 8 units
Dyed Aviation Gasoline	ASTM D 2392	Colour acceptability of aviation gasoline that has been dyed for easy identification of grade.	Minimum and maximum limits of red, blue, green, brown and purple dyes
Hazen Colour, see Platinum-Cobalt			
Gardner Colour	ASTM D 1544	Oils and chemicals ranging from pale yellow to red.	1 - 18 units
Iodine Colour	DIN 6162	Oils and chemicals ranging from yellow to brown. For colours registering 1 or less on the Iodine scale, the Pt-Co Colour scale is applicable.	1 - 500 units
IP Units	IP 17 Method B	Light coloured products such as refined undyed motor fuel, white spirit or kerosine.	Water White (0.25) to Standard White (4.0)
Lovibond® RYBN	IP 17 Method A	Petroleum products in terms of Lovibond® Red, Yellow and Blue units.	0.1 - 70 Red, Yellow 0.1 - 40 Blue 0.1 - 3.0 Neutral
Platinum-Cobalt/Hazen/ APHA Colour	ASTM D 1209, ASTM D 5386	Clear liquids such as petroleum spirits, solvents and alcohols.	0 - 500 mg Pt/l
Saybolt Colour	ASTM D 156, ASTM D 6045, JIS K 2580	Light coloured petroleum products including aviation fuels, kerosine, white mineral oils, hydrocarbon solvents and petroleum waxes.	-16 (darkest) to +30 (lightest)



		Spectrophotometric Colorimeters						Visual Colorimeters		Visual Comparators				
COLOUR SCALES		•	•	•	•	•	•		•					
ASTM Color		•	•	•	•	•	•							
Saybolt Colour		•	•	•	•	•	•					•		
Pt-Co/Hazen/APHA		•	•	•	•	•	•					•		
Lovibond RYBN		•	•	•	•	•	•							
IP Units		•	•	•	•	•	•	•						
Gardner Colour		•	•	•	•	•	•			•				
Iodine Colour		•	•	•	•	•	•							
Acid Wash Colour		•	•	•	•	•	•							
Dyed Aviation Gasoline		•	•	•	•	•	•							
COLOUR VALUES		•	•	•	•	•	•							
XY Z tristimulus values		•	•	•	•	•	•							
x y Y chromaticity co-ordinates		•	•	•	•	•	•							
CIE L*a*b* colour space		•	•	•	•	•	•							
L*C*H colour space		•	•	•	•	•	•							
Hunter L a b colour space		•	•	•	•	•	•							
Δ E colour difference		•	•	•	•	•	•							
Transmittance		•	•	•	•	•	•							
Optical density		•	•	•	•	•	•							
Path length		Up to 6" (153mm)	Up to 6" (153mm)	Up to 6" (153mm)	Up to 6" (153mm) ³⁾	Up to 50 mm	Up to 50 mm	Up to 6" (153mm)	33 mm tube	10 mm	Up to 40 mm	Up to 288 mm		
Windows software		•	•	•	•	•	•							
Integrated heater unit		•	•	•	•	•	•							

• included as standard o optional upgrade 1) 0.5 - 5 ASTM Color units for diesel fuel 2) The current Gardner scale was specified in 1963; Lovibond® glass filters are also available for earlier 1953 and 1933 versions

3) Results reported as for 18" cell

Lovibond® Instrument Selection Guide

Lovibond® PFX995/P, PFX950/P, PFX880P &

Certain product sectors have adopted one-dimensional scales to simplify colour control when the range of sample colours involves varying intensities of a single hue. To satisfy the diverse requirements for colour data, the Lovibond® series of high-precision, spectrophotometric colorimeters offers a choice of more than twenty colour scales. The standard versions vary from focussed instruments for Saybolt and ASTM Colour through to a flexible, full-scale package. Additional scales can be added as optional upgrades, either at the time of purchase or at a later date.



PFX995/P: Comprehensive Colour Data Requirements

The Lovibond® PFX995/P provides objective, unbiased colour data according to a comprehensive range of established industry scales, as well as CIE values and spectral data. It is ideal for companies that process a broad selection of product types with varied colour specifications, particularly in central test facilities or in independent testing laboratories. The instrument is easily customised to display only those scales of interest to the user.

PFX950/P: Core Colour Scales for Mineral Oils and Petrochemicals

The Lovibond® PFX950/P is an economical version of the PFX995/P incorporating the popular scales that meet the colour analysis requirements of many oil refineries. It includes both Saybolt Colour and ASTM Color - scales that are accepted internationally for oil analysis - as well as Platinum Cobalt Colour for oil derivatives and petrochemicals.

PFX880/P: Automated Saybolt Colour and ASTM Color

The Lovibond® PFX880/P is a limited-scale, automatic colorimeter for Saybolt & ASTM Color. It is designed to conform to the instrument specification in ASTM D 6045. Results can also be displayed in terms of CIE values and spectral data.

PFX880/IP17: Automated Lovibond® Colour and IP Units

The Lovibond® PFX880/IP17 is a limited-scale, automatic colorimeter for Lovibond® Colour and IP Units, the colour scales specified in the Institute of Petroleum's Method 17. Results can also be displayed in terms of CIE values and spectral data.

PFX880/IP17 Petrochemical Tintometers®

Colour Scale	Range	Path length	Resolution	PFX995/P	PFX950/P	PFX880/P	PFX880/IP17
Saybolt Colour	-16 (darkest) to +30 (lightest)	100 mm	1	•	•	•	o
ASTM Color	0.5 - 8 units	33 mm	0.1	•	•	•	o
Pt-Co/Hazen/APHA Colour	0 - 500 mg Pt/l	100 mm	1	•	•	o	o
Gardner Colour	1 - 18 units	10 mm	0.1	•	o	o	o
Lovibond® RYBN	0 - 70 Red, Yellow; 0 - 40 Blue; 0 - 3.9 Neutral	1/16" - 6"	-	•	o	o	•
IP Units	Water White (0.25) to Standard White (4.0)	6"	-	•			•
CIE Values	Defined by spectrum locus	Depends on saturation of sample colour	-				
- X Y Z Tristimulus values				•	•	•	•
- x y Y Chromaticity coordinates				•	•	•	•
- CIE L*a*b* Colour space				•	•	•	•
- L*C*h Colour space				•			
- Hunter L a b Colour space				•			
- ΔE colour difference				•	•	•	•
Spectral Data							
- transmittance	0 - 100% (full spectrum and specified wavelength)		0.01%	•	•	•	•
- optical density	0 - 2.5 (full spectrum and specified wavelength)		0.0001	•			
Optional Items for Individual Applications							
Integrated heater unit	A factory fitted option for maintaining samples such as waxes in a liquid state.			o	o	o	o
Windows™ software for data capture on PC	Allows data sets to be automatically downloaded to a PC computer where they can be processed or stored. It also permits remote control of the instrument.			•	o	o	o
Conformance filter sets	Sets of graded glass filters, representing a spread of colours from each of the main scales, are available for quick and simple calibration checks (see page 11).			o	o	o	o
Certified colour reference standards	Ideal for routine calibration of and verification of test data (see page 11).			o	o	o	o

• included as standard

o available as an optional upgrade

Colour Analysis made Simple

These four colorimeters are all easy to use, automatic instruments. There is no need to build up calibration curves as they are already established in the instruments. The menu system guides operators through the selection of operating parameters. Thereafter, measurements are initiated by just a single key press and take less than 25 seconds to complete. The accuracy, repeatability and reproducibility of data provided by the instruments allow for tighter colour specifications and greater colour consistency, giving companies the confidence needed to make important decisions regarding high value consignments and refining operations. When measuring Saybolt or Pt-Co Colour of clear, water-white products, the long sample path length ensures precise colour measurements, without multiplying errors.

Confidence in Instrument Performance

The PFX995/P, PFX950/P, PFX880/P and PFX880/IP17 are rugged colorimeters with a fabricated steel housing; they are designed to function equally as a QC instrument within the laboratory or on 24 hour operation in a production environment. A diagnostic test routine and status report allows users to conduct periodic checks on the instrument or identify faults.



The precision filament lamp is easily accessed and changed from outside the instrument



For regular conformance testing the colorimeters are also supplied with a certified glass filter of specified colour value.

TECHNICAL SPECIFICATION

Measuring principle	16 interference filters
Spectral response	420 - 710 nm
Bandwidth	20 nm
Repeatability	
- chromaticity (x y)	± 0.0002
- transmittance	± 0.25 %
- Saybolt values	± 1
Measurement time	Less than 25 seconds
Calibration	Single key press; fully automated
Light source	5 Volt, 10 Watt tungsten halogen lamp (lens ended)
Illuminant	CIE Illuminant C (A, C, D65 on PFX995/P)
Observer	2° (2°, 10° on PFX995/P)
Path length	0.1 - 153 mm (0.004" - 6")
Interface	Parallel printer port, RS 232 port
Input voltage	Universal, via external power supply
Approvals	CE
Display	2 x 40-character, back-lit LCD
Keypad	21 key membrane keypad; washable polyester with audible feedback
Instructions	7 languages - English, French, German, Spanish, Italian, Portuguese, Dutch
Heater unit	Factory fitted option, 95 °C max
Instrument housing	Fabricated sheet steel with tough, textured paint finish
Dimensions	Width 515 mm, depth 195 mm, height 170 mm
Weight	7.75 kg

Each instrument is supplied complete with optical glass cells of the relevant path lengths for each of the colour scales included, a calibrated glass conformance filter, a sample bottle of a certified colour reference solution, a spare lamp and instructions.

Lovibond® PFX195 Automatic Colorimeter



Automatic Grading of One Dimensional Colour Scales

The Lovibond® PFX195 is a low-cost spectrophotometric colorimeter, which automatically measures the colour of transparent samples according to the one-dimensional colour scales that have been adopted as industry standards in oils and chemicals processing. Results can also be displayed in terms of spectral data and CIE values. Each version of the PFX195 includes a selection of standard colour scales that is used in a specific industry sector: the PFX195/1 for chemicals, industrial oils and fatty acids and the PFX195/2 for petroleum oils and fuels. Colour scale upgrade kits enable additional colour scales to be added to standard instrument versions. The PFX195 also allows users to obtain a closest match to stored references or to build up a customised scale from a series of reference samples. It includes a calculation and description of off-hue factor for many scales.

Colour Scale	Range	Path length	PFX195/1	PFX195/2
Saybolt Colour	-16 (darkest) to +30 (lightest)	50 mm	o	•
ASTM Color	0.5 - 8 units	33 mm	o	•
Pt-Co/Hazen/APHA Colour	0 - 500 mg Pt/l	50 mm	•	•
Gardner Colour	1 - 18 units	10 mm	•	o
Iodine Colour	1 - 500 units	10 mm	•	
Acid Wash Colour (ASTM D848)	1 - 14	Tube AF223	o	o
CIE Values	Defined by spectrum locus	Depends on saturation of sample colour		
- X Y Z tristimulus values			•	•
- x y Y chromaticity co-ordinates			•	•
- CIE L*a*b* colour space			•	•
- ΔE colour difference			•	•
- CIE L*C*h			o	o
Spectral data - transmittance	0 - 100 % (full spectrum and specified wavelength)		•	•
- optical density	0 - 2.5 (full spectrum and specified wavelength)		•	•
Optional Items for Individual Applications				
Conformance filter sets	Sets of graded glass filters, representing a spread of colours from each of the main scales, are available for quick and simple calibration checks (see page 11).		o	o
Certified colour reference standards	Ideal for routine calibration of and verification of test data (see page 11).		o	o
Adaptor for 10.65 mm (Gardner) tubes	For Gardner colour of hot samples in tubes eg testing the colour stability of fatty acids and drying oils after heating.		o	o
Adaptor for 33 mm (ASTM Color) tubes	For ASTM Color of samples in tubes.		o	o
Spectrophotometer cell holder	Allows use of standard width (12.5 mm) spectrophotometer cells.		o	o

• included as standard

o available as an optional upgrade

Confidence in Colour Measurement

The Lovibond® PFX195 responds to the demand for consistent and reliable colour data, from R&D through to processing and production. It removes all subjectivity involved in colour measurement, supplying unbiased readings that are unaffected by operator or environment. The proven optical system ensures excellent repeatability of measurements giving confidence in communication and control of colour. For regular conformance testing the PFX195 is supplied with a certified glass filter of specified colour value, (filter sets are available).

Colour Testing and Analysis Made Simple

The Lovibond® PFX195 is an easy to use, automatic instrument requiring no special skills to operate. The built-in menu guides users through the selection of operating parameters such as colour scale. Thereafter, readings are made with a single key press, taking less than 25 seconds to complete. Data sets can be saved in the instrument, printed out or automatically down loaded to a PC computer where they can be processed and stored for future analysis, traceability and monitoring trends. ΔE colour difference measurements can be used to ensure samples fall within acceptable colour limits. A Windows™ software program enables the generation of spectral and CIE diagrams as well as analysis of spectral data. It also permits direct control of the PFX195 from the computer.

Ideally Suited to Laboratory or Production Environments

Comprehensive facilities for colour measurement and data analysis make the Lovibond® PFX195 an ideal choice for the laboratory. However, with excellent calibration stability, password protection for tamper proof control and simple operation, the Lovibond® PFX195 also supports the migration of quality control to the manufacturing area, making it a cost-effective option for dedicated production testing. For easy maintenance, the Lovibond® PFX195 includes a robust steel sample chamber, which is easily removed, then cleaned or replaced if a spillage occurs, and the precision filament lamp is easily assessed and changed from outside the instrument.

TECHNICAL SPECIFICATION

Measuring principle	9 interference filters
Spectral response	420 - 710 nm
Repeatability	
- chromaticity (x,y)	± 0.0004
- transmittance	± 0.5 %
Measurement time	Less than 25 seconds
Calibration	Single key press, fully automated
Light source	5 Volt, 10 Watt tungsten halogen lamp (lens ended)
Illuminants	CIE Illuminant A, C, D65
Observers	2°, 10°
Path length	0.1 - 50 mm
Interface	Parallel printer port, RS 232 port
Data storage	Up to 32 data sets
Input voltage	Universal, via external power supply
Approvals	CE
Display	2 x 40-character, back-lit LCD
Keypad	21-key membrane keypad; washable polyester with audible feedback
Instructions	7 languages - English, French, German, Spanish, Italian, Portuguese and Dutch
Instrument housing	Fabricated sheet steel with tough, textured paint finish
Dimensions	Width 435 mm, depth 195 mm, height 170 mm
Weight	6.8 kg

Each PFX195 is supplied complete with Windows™ software, optical glass cells for the colour scales included, a certified glass filter of specified colour value for regular conformance testing, a sample bottle of a certified colour reference solution, a spare lamp and instructions.



Lovibond® Tintometer® Model F

The Lovibond® Tintometer® Model F is a visual colorimeter for measurement of practically all petroleum products in terms of Lovibond® units according to IP 17 Method A. Colour is determined by comparing the light transmitted through the sample with that transmitted through Lovibond® Colour standards - a series of accurately calibrated coloured glasses in each of the colours red, yellow and blue, going from very pale to dark. Waxes are measured for colour either by transmitted light when in a molten condition or by reflected light when solid. The Model F is supplied with a complete set of 11 racks containing the Lovibond® Colour standards (Red 0.1 - 0.9, 1.0 - 9.0, 10.0 - 70; Yellow 0.1 - 0.9, 1.0 - 9.0, 10.0 - 70; Blue 0.1 - 0.9, 1.0 - 9.0, 10.0 - 40; Neutral 0.1 - 0.9, 1.0 - 3.0), a sample chamber liner with a white PTFE reference, a spare white reference, rectangular fused glass cells, a colour analysis records book and instructions.



Lovibond® Petroleum Oils Comparator

The Lovibond® Petroleum Oils Comparator (POC) conforms to the instrument requirements specified in ASTM D 1500 for visual determination of ASTM Color by direct comparison with coloured glass standards. It is widely used for colour grading of petroleum products such as lubricating oils, heating oils and diesel fuel. The POC is a 3-field instrument which incorporates the 16 glass standards that make up the scale in a pair of discs. With a 3-section field of view, the sample and two adjacent standards on the ASTM Color scale are viewed simultaneously, making it easier to achieve the optimum colour match. For rapid grading within predetermined colour limits, the glass standards can be set to the two limiting colours. The tungsten halogen light source is colour corrected to CIE illuminant C, guaranteeing constant lighting conditions for colour grading, irrespective of ambient lighting.



Lovibond® Gardner Comparator 3000

A single scale, 3-field instrument for visual colour grading by direct comparison between the sample and Lovibond® glass colour standards housed in a pair of discs. The advantage of a 3-section field of view is that the sample and two consecutive glasses on the colour scale are viewed simultaneously, making it easier to achieve the optimum colour match. For rapid colour grading within predetermined colour limits, the glass standards can be set to the two limiting colours so that it is easy to check that the sample is within tolerance. The tungsten halogen light source is colour corrected to CIE standard illuminant C, which guarantees constant lighting conditions for colour grading. The samples are measured in 10.65 mm diameter clear glass tubes.

Lovibond® Comparator System 2000

A Flexible, Modular System for Visual Colour Grading

Using a suitable Comparator instrument, the sample is visually matched against calibrated, colour stable glass standards in test discs. The Comparator 2000+ is a short path length instrument (up to 40 mm) for visually matching samples with relatively dark colours. Nessleriser systems are longer path length instruments for matching a column of sample in a glass cylinder of appropriate path length; they are designed for measuring unsaturated samples that are below the sensitivity of the Comparator 2000+. A selection of Lovibond® colour grading discs for use with the Comparator System 2000 is shown below.

Colour Scale	Disc	Range Covered	Instrument	Accessories Required
ASTM Color	4/81	1, 2, 3, 3.5, 4, 4.5, 5 units ¹⁾	Comparator 2000+	33 mm cell W680/OG/33
	4/82	0.5, 1, 2, 3, 3.5, 4, 4.5 units ¹⁾	Comparator 2000+	33 mm cell W680/OG/33
Dyed Aviation Gasoline	4/78	Blue, Green, Brown, Purple (min and max of each)	Nessleriser 2250	200 mm cylinders, DB421
	4/79	Red (min and max)	Nessleriser 2250	200 mm cylinders, DB421
Gardner Colour	4/30AS	1, 2, 3, 4, 5, 6, 7, 8, 9 units	Comparator 2000+	10 mm cell W680/OG/10
	4/30BS	10, 11, 12, 13, 14, 15, 16, 17, 18 units	Comparator 2000+	10 mm cell W680/OG/10
Pt-Co/Hazen/APHA	4/28	50, 75, 100, 150, 200, 250, 300, 400, 500 mg Pt/l	Comparator 2000+	40 mm cell W680/OG/40
	4/28A	200, 225, 250, 300, 350, 400, 450, 500 mg Pt/l	Comparator 2000+	40 mm cell W680/OG/40
	NSH	10, 20, 30, 40, 50, 60, 70, 80, 90 mg Pt/l	Nessleriser 2150	113 mm cylinders AF 306/P
	NSB	70, 85, 100, 125, 150, 175, 200, 225, 250 mg Pt/l	Nessleriser 2150	113 mm cylinders AF 306/P
	NSX	50, 60, 70, 80, 100, 150, 200, 250, 300 mg Pt/l	Nessleriser 2150	113 mm cylinders AF 306/P
	CAA	0, 2.5, 5.0, 7.5, 10, 15, 20, 25, 30 mg Pt/l	Nessleriser 2250	250 mm cylinders DB 420
	CBB	30, 35, 40, 45, 50, 55, 60, 65, 70 mg Pt/l	Nessleriser 2250	250 mm cylinders DB 420
	1209/1	0, 2.5, 5.0, 7.5, 10, 15, 20, 25, 30 mg Pt/l	Nessleriser 1209 ²⁾	100 ml cylinders DB 423
	1209/2	30, 35, 40, 45, 50, 55, 60, 65, 70 mg Pt/l	Nessleriser 1209 ²⁾	100 ml cylinders DB 423
Optional Items for Individual Applications				
Daylight 2000 Lighting Unit	A standardised benchtop light source to guarantee constant lighting conditions for accurate colour grading, particularly when the sample is very pale in colour.			

¹⁾ Restricted range used by UK MoD for F76 type diesel fuel.

²⁾ Conforms to the path length requirements specified in ASTM D 1209

Test kits based on the Comparator System 2000

Available for the most commonly used colour scales and colorimetric tests, these kits are a convenient means of ordering the complete range of equipment required.



Type	Colour Scale	Range	Apparatus Included
AF 334	Gardner Colour	1 - 18 units	Lovibond® Comparator 2000+ with Daylight 2000 Lighting Unit, Gardner discs 4/30 AS & 4/30 BS, W680/OG/10 mm path length fused glass cell
AF 329	Pt-Co/Hazen/APHA Colour	0 - 250 mg Pt/l	Nessleriser 2150 with Daylight 2000 Lighting Unit and Nessler cylinders, Nessleriser 2250 upgrade with Nessler cylinders, Pt-Co/Hazen discs CAA, CAB & NSB, stand for using Nessleriser with natural lighting
AF 325	Pt-Co/Hazen/APHA Colour	10 - 250 mg Pt/l	Nessleriser 2150 with Daylight 2000 Lighting Unit and Nessler cylinders, Pt-Co/Hazen discs NSH & NSB, stand for using Nessleriser with natural lighting
AF 328	Pt-Co/Hazen/APHA Colour, Low Range	0 - 70 mg Pt/l	Nessleriser 2250 with Daylight 2000 Lighting Unit and Nessler cylinders, Pt-Co/Hazen discs CAA & CAB, stand for using Nessleriser with natural lighting
AF 327	Pt-Co/Hazen/APHA Colour, Low Range, according to ASTM D 1209	0 - 70 mg Pt/l	Nessleriser 1209 with the Daylight 2000 lighting unit and 100 ml (288 mm) Nessler cylinders, Pt-Co/Hazen discs 1209/1 & 1209/2, deionised water

Colorimetric Chemical Analysis

Colorimetric chemical analysis is a quantitative test method which relies on measuring the intensity of colour produced by chemical reactions to determine the concentration of a particular chemical present in a sample. Procedures for colorimetric analysis rely on three basic stages:

- isolation of the chemical from interfering materials which may be present;
- production of a colour by the action of an appropriate chemical reagent on the isolated chemical;
- measurement of the depth of colour so produced which is proportional to the concentration of the chemical.

Tintometer has simplified the procedure for many popular colorimetric tests by supplying standard methods and a corresponding series of ready-made coloured glass filters, which are calibrated to allow direct measurement of concentration levels. The treated sample and the glass filters are viewed together in a 'Comparator' instrument under standardised lighting conditions to obtain the optimum colour match. The following colorimetric test discs are available:

Test	Disc	Range Covered	Instrument	Accessories Required	Scope
Acid Wash Colour	29 64 30	1, 2, 3, 4, 5, 6, 7, 8	Comparator 2000+	Tube AF 223	Quality testing of industrial aromatic hydrocarbons according to ASTM D 848
Anti-Icing Additives	4/33	0.04, 0.06, 0.08, 0.10, 0.12, 0.14, 0.15, 0.16, 0.18 % by vol.	Comparator 2000+	10 ml, 13.5 mm cells	Determination of % by volume of diethylene glycol monomethyl ether in aviation fuels
	4/44A	0, 0.05, 0.07, 0.08, 0.1, 0.12, 0.15, 0.2% by vol	Comparator 2000+	10 ml, 13.5 mm cells	As above, conforms to NATO requirements
Carbonisable Substances	4/46	0.2, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0 % insolubles	Comparator 2000+	13.5 mm cells	Measurement of % insolubles in lubricating oil
	29 16 10	Pass/fail, single filter	Comparator 2000+	Tube AF 260	Quality testing of white mineral oils (ASTM D 565)
	29 64 90	Pass/fail, single filter	Comparator 2000+	10 mm cell W680/OG/10	British Pharmacopoeia sulphuric acid test for carbonisable substances in liquid paraffin
Euromarker in Kerosine	4/71	0, 20, 50, 100, 120, 150%	Comparator 2000+	Extraction tube AF 262	Determination of % of recommended dosage (6 mg/l).
Euromarker in Clean Diesel	4/72	0, 50, 75, 100, 125%	Comparator 2000+	Extraction tube AF 262	Warehouse test for determination of % recommended dosage (6mg/l).
	4/73	0, 5, 10, 20, 30, 40, 50, 75, 100% marked oil	Comparator 2000+	Extraction tube AF 262	Roadside test for determination of % of marked oil in unmarked oil
Impurities in Acetone	29 28 00	Pass/fail, single filter	Nessleriser 2150	Nessler cylinders AF 306/P	Quality testing of acetone and methanol according to ASTM D 1363
Lead Content	5/17	0.002, 0.004, 0.006, 0.008, 0.010, 0.012, 0.014, 0.016, 0.018, 0.02 mg Pb	Comparator 2000+	5 mm cell W680/OG/5 20 mm cell W680/OG/20	Aviation turbine fuels and light petroleum distillates, as specified in IP 224
	29 65 90	2, 4, 6, 8, 10, 12, 14, 16, 20 ppb	Comparator 2000+	13.5 mm cells	Determination of trace concentrations of lead gasoline or naphthas, UOP Method 350
Methanol in Water	29 99 70	0, 100, 300, 500, 700, 900, 1200, 1500, 2000 ppm VV	Comparator 2000+	13.5 mm cells	Methanol in water
Quinizarin in Marked Oils	4/43A	10, 20, 30, 40, 50, 60, 70, 80, 100% marked oil	Comparator 2000+	Extraction tube AF 262	Roadside test to determine presence of quinizarin marked oils as prescribed by HM Customs & Excise
	4/43B	40, 50, 60, 80, 100, 120, 140, 200% recommended dosage	Comparator 2000+	Extraction tube AF 260	Percentage of marker in marked oil. Warehouse test.

Accessories

Colorimetry Cells

We supply precision fused cells in a range of dimensions and path lengths, made from optical glass to the highest standards at our own factory. For instruments equipped with a heater unit and whenever cells are subjected to thermal shock, it is recommended that borosilicate cells be used.



Series	W600 Optical		W600 Borosilicate		W680 Optical	
Use	PFX995/950/880/195 Series, Tintometer® Model F				Comparator 2000/3000	
Path Length	Order Code	Type	Order Code	Type	Order Code	Type
10mm	60 59 60	W600/OG/10	65 59 60	W600/B/10	60 68 10	W680/OG/10
25 mm	60 59 90	W600/OG/25	65 59 90	W600/B/25	60 68 60	W680/OG/25
40mm	60 60 20	W600/OG/40	65 60 20	W600/B/40	60 68 90	W680/OG/40
50mm	60 62 00	W600/OG/50	65 62 00	W600/B/50	60 69 30	W680/OG/50
100 mm	60 60 30	W600/OG/100	65 60 30	W600/B/100		
1/16"	60 60 40	W600/OG/1/16"	65 60 40	W600/B/1/16"		
1/8"	60 60 60	W600/OG/1/8"	65 60 60	W600/B/1/8"		
1/4"	60 60 70	W600/OG/1/4"	65 60 70	W600/B/1/4"		
1/2"	60 60 80	W600/OG/1/2"	65 60 80	W600/B/1/2"		
1"	60 60 90	W600/OG/2"	65 60 90	W600/B/2"		
5/16"	60 61 30	W600/OG/5/16"	65 61 30	W600/B/5/16"		
6"	60 61 50	W600/OG/6"	65 61 50	W600/B/6"		

Conformance Filter Sets

Order Code	Colour Scale	No. Filters	Nominal Values
PFX995/P, PFX950/P & PFX880/P & PFX880/IP17			
13 95 10	ASTM Color	3	0.5, 3.5, 5.0
13 95 60	Gardner Colour	4	2, 8, 12, 17
13 76 60	IP Units	4	0.75, 1.25, 2.0, 3.5
13 96 10	Lovibond® Red Yellow Neutral	5	0.1R 0.5Y - 5.0R 34.0Y 0.1N
13 95 70	Pt-Co/Hazen/APHA (not PFX195)	5	5, 20, 50, 100, 300
13 93 80	Pt-Co/Hazen/APHA (PFX195)	5	5, 20, 50, 100, 300
13 95 80	Saybolt Colour (not PFX195)	5	-8, 0, +10, +18, +25
13 93 90	Saybolt Colour (PFX195)	5	-8, 0, +10, +18, +25
10 99 70	Single Filter (Certificated)	1	Select scale and nominal value from above
10 99 80	User Specified Filter	1	Specify scale and value when ordering
Tintometer® Model F			
18 50 00	Lovibond® Red Yellow	5	0.1R 0.5Y - 5.0R 34.0Y
Petroleum Oils Comparator			
34 10 00	ASTM Color	3	0.5, 3.5, 5.0
Gardner Comparator 3000			
34 20 00	Gardner Colour	2	3, 17



Conformance filter sets allow quick and simple conformance checks on Lovibond® instruments. Each filter set consists of coloured glasses representing a spread of colours from the scale of interest, which are mounted on suitable holders. They are supplied in a presentation box with a Certificate of Conformity that states the actual values for each filter and confirms that they have been manufactured and inspected under the control of our ISO 9001: 2000 Quality Management System. In addition, Tintometer's UKAS accredited calibration laboratory can supply glass filters for Lovibond® instruments with colour measurements that are directly traceable to national standards.

Certified Colour Reference Standards

- Ideal for routine calibration and verification of test data.
- Ensures good inter-laboratory and inter-instrument correlation.
- Supplied in a 500 mL bottle with a 12-month shelf life.
- Full traceability to internationally recognised standards (ASTM, Saybolt & Gardner Colour standards certified under UKAS to ISO 17025; Lovibond® RYBN & Pt-Co Colour certified under ISO 9001: 2000 quality system).
- All classified as non-hazardous according to EU directives.
- Each bottle supplied with full certification including MSDS.



Colour Scale	Nominal Certified Value	Order Code	Accreditation
ASTM Color	<0.5	134290	ISO 17025
	1	134000	ISO 17025
	3	134010	ISO 17025
	5	134020	ISO 17025
Gardner Colour	2	134200	ISO 17025
	5	134210	ISO 17025
	8	134220	ISO 17025
Lovibond® RYBN Colour	0.4R 1.9Y 0.1N (5 1/4")	134080	ISO 9001
	1.0R 4.3Y 0.1N (5 1/4")	134090	ISO 9001
	1.4R 7.3Y 0.2N (5 1/4")	134100	ISO 9001
	1.6R 11.0Y 0.1N (5 1/4")	134110	ISO 9001
	1.8R 14.0Y 0.3N (5 1/4")	134120	ISO 9001
	2.5R 24.0Y 0.5N (5 1/4")	134130	ISO 9001
	3.3R 33.0Y 0.3N (5 1/4")	134230	ISO 9001
Pt-Co/Hazen/APHA Colour	5	134140	ISO 9001
	10	134150	ISO 9001
	15	134160	ISO 9001
	30	134170	ISO 9001
	50	134180	ISO 9001
	100	134190	ISO 9001
Saybolt Colour	500	462803	ISO 17025
	-10	134040	ISO 17025
	0	134050	ISO 17025
	+12	134060	ISO 17025
	+25	134070	ISO 17025



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