

Elcometer 456 Coating Thickness Gauge

Can be used in accordance with:
AS/NZS, ASTM, BS, DIN, ECCA, EN, IMO, ISO, SS, SSPC, US Navy



The **Elcometer 456 Coating Thickness Gauge** sets new standards; providing reliable and accurate coating thickness measurements; helping you to become more efficient.

The **Elcometer 456 dry film thickness gauge** is available in three different models. Each coating thickness gauge provides the user with increasing functionality - from the entry level Elcometer 456 Basic, to the top of the range Elcometer 456 Top.

Integral dry film coating thickness gauges are ideal for single handed operation as the wide footprint of the Bigfoot™ internal probe provides greater stability during coating thickness measurement - allowing for consistent, repeatable and accurate dry film thickness results.

Separate dry film coating thickness gauge models, with their wide range of probes, provide even greater dry film thickness measurement flexibility.

Compatible with ElcoMaster® software and ElcoMaster® Mobile App, individual coating thickness measurements can be transferred via USB or Bluetooth to PC or a mobile device for analysis and instant report generation.

Halve inspection times using the Elcometer 456 Coating Thickness Gauge with Scan Probe

(Click on the image to access the video)



Featuring a highly durable probe cap, the Elcometer 456 Coating Thickness Gauge Scan Probe is a revolutionary design which allows users to take individual dry film thickness readings or rapidly scan large surface areas - without damaging the probe or the coating.

When used in conjunction with the Elcometer 456 Coating Thickness Gauge Scan or Auto Repeat Mode, the Scan Probe enables users to significantly reduce dry film thickness inspection times without affecting accuracy. With a reading rate of 140 readings per minute, the Elcometer 456 Coating Thickness Gauge with Scan Probe allows you to inspect more coatings in less time.

Features

- Specialised probes to meet a wide range of applications
- Integral and separate gauges to measure coatings up to 30mm
- Dust and water resistant rugged design to IP65
- Drop tested to a height of 2m
- Secure probe connection for improved durability
- Bigfoot™ integral probe for accurate and repeatable measurements
- Ergonomic design for comfort during continuous use
- 2.4" (6cm) colour screen provides enhanced reading visibility at all angles
- Fast reading rate of more than 70 readings per minute
- Large easy to read colour display
- Scratch and solvent resistant screen
- Alpha numeric batch identification
- Large positive buttons with feedback
- USB and to ElcoMaster® 2.0 software Bluetooth data output



Easy

- Large buttons ideal for gloved hands
- Easy to use menus in multiple languages
- High contrast colour LCD with auto rotate
- High and low reading limit indicators
- Factory calibrated for immediate use

Accurate

- Thickness measurement capability to $\pm 1\%$
- Can be used in accordance with National & International Standards
- Temperature stable measurements
- Increased reading resolution for thin coatings
- Measures accurately on smooth, rough, thin and curved surfaces

Reliable

- Repeatable and reproducible
- 2 year gauge warranty
- Supplied with fully traceable test certificates
- Batch date and time stamp facility

Rugged

- Sealed, heavy duty and impact resistant
- Dust and waterproof equivalent to IP64
- Scratch and solvent resistant display
- Durable gauge and probe construction
- Suitable for use in harsh environments

Efficient

- Fast reading rate of 70+ per minute, 140+ per minute with Scan Probe
- Multiple calibration memories
- Alpha numeric batch identification
- User selectable calibration methods
- Compatible with ElcoMaster® and ElcoMaster® Mobile App

Powerful

- Wide range of interchangeable probes
- USB and Bluetooth data output to iPhone* or Android™ devices
- Stores up to 150,000 readings in 2,500 batches
- Measures up to 31mm of coating on metal substrates



Bigfoot™ integral probe for accurate and repeatable measurements



Ergonomic design for comfort during continuous use



2.4" (6cm) colour screen provides enhanced reading visibility at all angles



Large easy to read measurements in Metric and Imperial units



Halve the inspection time using the scan probe



View up to 8 user selectable statistics on screen



Rugged and reliable, ideal for harsh environments

The importance of Coating Thickness Gauge Calibration

(Click on the image to access the video)



Formal quality systems, such as those described in ISO 9001, require coating thickness gauges to be properly controlled, logged and calibrated. Increasingly, users are specifying that the readings taken by thickness gauges are traceable to National Standards. In order to test the accuracy of a particular gauge it is important to have traceable coating thickness standards.

Elcometer offer a comprehensive range of certified foils together with zero test plates to ensure the accuracy of the coating thickness gauge. Get the best performance from the Elcometer 456 Coating Thickness Gauge and make the best use of the gauge's $\pm 1\%$ accuracy by calibrating the coating thickness instrument to suit the application.

Product Features

		■ Standard	□ Optional
	Model B	Model S	Model T
Fast, accurate reading rate; 70+ readings per minute	■	■	■
Repeatable & reproducible measurements	■	■	■
Easy to use menu structure; in 30+ languages	■	■	■
Tough, impact, water & dust resistant; equivalent to IP64	■	■	■
Bright colour screen; with permanent back light	■	■	■
Scratch & solvent resistant display; 2.4" (6cm) TFT	■	■	■
Large positive feedback buttons	■	■	■
USB power supply; via PC	■	■	■
Test certificate	■	■	■
2 year gauge warranty*	■	■	■
Automatic rotating display; 0°, 90°, 180° & 270°	■	■	■
Ambient light sensor; with adjustable auto brightness	■	■	■
Emergency light	■	■	■
Tap awake from sleep	■	■	■
Gauge software updates ¹ ; via ElcoMaster [®] software	■	■	■
Data output	■	■	■
USB; to computer	■	■	■
Bluetooth [®] ; to computer, Android [™] & iOS ⁺ devices	■	■	■
On screen statistics	■	■	■
Number of readings; η	■	■	■
Mean (average); \bar{x}	■	■	■
Standard deviation; σ	■	■	■
Highest reading; H_i	■	■	■
Lowest reading; L_o	■	■	■
Coefficient of variation; CV%	■	■	■
Elcometer index value ² ; EIV	■	■	■
Nominal dry film thickness; NDFT	■	■	■
IMO PSPC; %>NDFT, %>90	■	■	■
High & low limits; definable audible & visual alarms	■	■	■
Number above high limit;	■	■	■
Number below low limit;	■	■	■
Live reading trend graph; in batch mode	■	■	■
ElcoMaster [®] software & USB cable	□	■	■
Replaceable screen protectors	□	■	■
Protective case	■	■	■
Plastic transit case	□	□	■
Integral models; with automatic gauge switch on	■	■	■
Probe type; Ferrous (F), Non-Ferrous (N), Dual (FNF) ³	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range	0-13mm	0-1500 μ m	0-1500 μ m

Separate models; with automatic probe recognition	■	■	■
Probe type; Ferrous (F), Non-Ferrous (N), Dual (FNF) ³	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range	0-31mm	0-31mm	0-31mm
On-screen calibration instructions; in 30+ languages	■	■	■
Multiple calibration methods	■	■	■
Factory; resets to the factory calibration	■	■	■
2-point; for smooth and rough surfaces	■	■	■
1-point; zero calibration	■	■	■
Zero offset ⁴ ; for calibration according to ISO19840		■	■
Predefined calibration & measurement methods		■	■
ISO, SSPC PA2, Swedish, Australian		■	■
Automatic calibration; for rapid calibration		■	■
Calibration memory type; gauge (g) or gauge & batch (gb)	g	gb	gb
Number of batches; with unique calibrations		1	2,500
Calibration memories; 3 user-programmable memories			■
Measurement outside calibration warning			■
Calibration lock with optional PIN code unlock	■	■	■
Delete last reading	■	■	■
Gauge memory; number of readings	Last 5	1,500	150,000
Individual batch calibrations; sent to PC via ElcoMaster [®]	■	■	■
Limits user definable audible & visual pass/fail warnings	■	■	■
Gauge (g) or gauge & batch specific (gb) limits		g	gb
Date and time stamp		■	■
Batch types; normal, counted average, IMO PSPC		■	■
Navsea Mode			■
Batch review graph			■
Review, clear & delete batches		■	■
Copy batches and calibration settings			■
Alpha-numeric batch names; user definable on the gauge			■
Scan & Auto Repeat Modes; with Scan probe connected			■
Fixed batch size mode; with batch linking			■

* The Elcometer 456 is extendable within 60 days from date of purchase, free of charge, to 2 years

¹ Internet connection required

‡ Visit www.elcometer.com/sdk to find out how to integrate Elcometer's MFi certified products to your App

² Elcometer Index Values are used in the automotive industry to assess a coating's overall quality; USA patent number US7606671B2

³ FNF patent number USA: 5886522

⁴ Zero Offset USA patent number US6243661

Technical Specifications

Integral Model Options

Scale 1

Range: 0-1500µm

Accuracy*: ±1-3% or ±2.5µm

Resolution: 0.1µm: 0-100µm; 1µm: 100-1500µm

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFB11	A456CFS11	A456CFT11	●
Elcometer 456 Non-Ferrous Integral	A456CNB11	See separate gauges with N2 PINIP™ Probe		●
Elcometer 456 Dual FNF Integral	A456CFNFB11	A456CFNFS11	A456CFNFT11	●

Scale 2

Range: 0-5mm

Accuracy*: ±1-3% or ±20µm

Resolution: 1µm: 0-1mm; 10µm: 1-5mm

For higher resolution & accuracy on thin coatings Scale 2 gauges can be switched to the Scale 1 mode

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFB12	See separate gauges with N2 PINIP™ Probe		●



Scale 3

Range:	0-13mm
Accuracy*:	±1-3% or ±50µm
Resolution:	1µm: 0-2mm; 10µm: 2-13mm

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Integral	A456CFBI3	See separate gauges with N2 PINIP™ Probe		•

Separate Model Options

	Model B	Model S	Model T	C
Elcometer 456 Ferrous Separate	A456CFBS	A456CFSS	A456CFTS	•
Elcometer 456 Non-Ferrous Separate	A456CNBS	A456CNSS	A456CNTS	•
Elcometer 456 Dual FNF Separate	A456CFNFBS	A456CFNFSS	A456CFNFST	•

Probes are supplied separately

- * Whichever is the greater
- Test Certificate supplied as standard

See separate leaflet for the Elcometer 456 Separate Probe Options

Display information	2.4" (6cm) QVGA colour TFT display, 320 x 240 pixels
Battery type	2 x AA dry cell batteries, rechargeable batteries can also be used
Battery life	~24 hours of continuous use at 1 reading per second ⁵
Gauge dimensions (h x w x d)	141 x 73 x 37mm
Gauge weight	161g including supplied batteries
Operating temperature	-10 to 50°C

⁵ Using default settings & lithium batteries, alkaline or rechargeable batteries may differ

Packing List

Elcometer 456 Dry Film Coating Thickness Gauge
Calibration foils (integrals only)
Wrist harness
Transit case (T)
Protective case (B, S & T)
1 x Screen protectors (S & T)
2 x AA batteries
Operating instructions
USB cable (S & T)
ElcoMaster® software (S & T)



Standards

Can be used in accordance with:

AS 2331.1.4, AS 3894.3-B, AS/NZS 1580.108.1, ASTM B 499, ASTM D 1186-B*, ASTM D 1400*, ASTM D 7091, ASTM E 376, ASTM G 12, BS 3900-C5-6B*, BS 3900-C5-6A*, BS 5411-11*, BS 5411-3*, BS 5599, DIN 50981*, DIN 50984*, ECCA T1*, EN 13523-1, IMO MSC.215(82), IMO MSC.244 (83), ISO 1461, ISO 19840, ISO 2063, ISO 2178, ISO 2360, ISO 2808-6A*, ISO 2808-6B*, ISO 2808-7C, ISO 2808-7D, ISO 2808-12, JIS K 5600-1-7, NF T30-124, SS 184159*, SSPC PA 2, US Navy PPI 63101-000, US Navy NSI 009-32

* Standards not in bold have been superseded but are still recognised in some industries.

Major Users of the superceded 456 Mark 3 and the 345:

CSIR • SABS • SA Navy • Defence Force • Armscor • SA Navy • Denel • Naschem • Sonchem • ALL Major Motor Assemblers incl. Daimler Benz • Nissan • Ford / Mazda • BMW • Toyota • VW • Tata • MAJOR Industrial Painters eg. RJ Southey • Gordon Bennett • Paint Manufacturers: Plascon • Dulux • Dekro • Stoncor • Sigma • Jotun • Corrosion Consultants / Inspectors • Anodisers incl Huletts • Portnet • Spornet & SATS • Transwerk • Transnet • Eskom • ISCOR • Public Works • SASOL • Mossgas • Shell, BP & Caltex Refineries • Anglo American • Vaal Mines • Impala Plat • Telkom • SA Airways & Atlas • Atomic Energy Board • Water Boards • Dept Water Affairs • Dorbyl & Heavy Engin • Universities • Govt & Municipal Authorities • Powder Coaters • Pipeline Co's • Sand / Shot Blasters • Metal Fabricators • Galvanisers • Shipbuilders • NACE • Hot Dip Galvanising Ass. • SAPITI • Corrosion Institute • Bulldog • Group 5



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The Elcometer 456 Coating Thickness Integral & Separate model range



The Elcometer 456 is available in 3 different models: B, S and T. Each gauge provides the user with increasing functionality - from the entry level Elcometer 456 B, to the top of the range Elcometer 456 T, with memory, alpha-numeric batching and Bluetooth communication.

Integral gauges are ideal for single handed operation as the wide footprint of the Bigfoot™ internal probe provides greater stability during measurement - allowing for consistent, repeatable and accurate results.

Separate models, with their wide range of probes, provide even greater measurement flexibility.

All probes are fully interchangeable; whilst ferrous gauges accept any ferrous probe and non-ferrous gauges accept any non-ferrous probes the dual FNF gauges accept all ferrous, non-ferrous and dual FNF probes.

Coating Thickness Gauges - Digital

Simple to interpret, small and portable gauges for the measurement of coatings on all metal surfaces. Digital coating thickness gauges are more accurate, more repeatable and more reproducible than any other type of coating thickness gauge on the market today. Coating Thickness Gauges are also known as Dry Film Thickness Gauges or DFT gauges.

Elcometer offers the world's most comprehensive range of portable digital coating thickness gauges - for measurements on either Ferrous substrates (F), Non-Ferrous substrates (NF), or on both Ferrous and Non-Ferrous (FNF), Elcometer can provide you with a gauge to meet your need.

The Language of Coatings

With a wide choice of gauges to choose from, the User needs to understand the terminology of Coating Thickness Gauges or, 'The Language of Coatings'. To select the appropriate gauge for your application, you need to answer specific questions.

1. What is the substrate (the surface metal) you are coating / inspecting?

Is the metal a Ferrous Substrate (F) or a Non-Ferrous (NF)?

Sometimes this is difficult to answer – the substrate may have already been coated. The easiest way to identify this is to see if a magnet will stick to the surface. If it does, then the substrate is Ferrous, if not, then it is Non-Ferrous.

2. Do you measure only on this substrate?

If you only inspect one type of product, then the answer is yes. If you have a range of products that you inspect, then you need to consider whether they are all of the same type of substrate. You should also consider if you have a future possibility of inspecting other substrates. If so, you should consider a Dual FNF gauge.

3. Typically, what sort of coating thickness do you need to measure?

This helps you select the correct scale range: Scale 1 measures coatings to 1500µm, Scale 2: 5mm, Scale 3: 13mm, Scale 6: 25mm, Scale 7: 31mm

4. What type of probe do you need?

Depending on your application you can select from:

- Integral Probe (the probe is built into the gauge for single hand measuring on large surface areas)
- Separate Probe (the probe is connected to the gauge by a cable for all applications).
- PINIP™ (separate probe is directly attached to the base of the instrument – providing, in your separate gauge, all the benefits of an integral unit).

Separate Probes can be selected from our wide range to meet your application requirements. These include:

- *Regular Probes*: Including Straight, Right Angle (90°) and Telescopic options
- *Miniature Probes*: Including Straight, Right Angle (90°), 45° Angle all in either long or short versions.
- *Scan Probes*: Slide the Scan Probe over the coating to get a reading: F, FNF, Scale 1 & 2

5. Do you need to save your readings for your ISO records, or as proof of inspection to your customer?

Elcometer gauges are available in three options:

- *Basic Gauge* - with simple statistics, memory of 5, Bluetooth output and optional USB
- *Standard Gauge* - with statistics, links via Bluetooth or USB, limited memory (1,500 readings) in one batch
- *Top Gauge* - with statistics, link via Bluetooth or USB, enhanced memory (150,000 readings), batch capability

Measurement Options

Ferrous (F) operation using electromagnetic induction probes for all non-magnetic coatings on a ferrous (magnetic) substrate, e.g. paint, plastic, enamel, powder, rubber, ceramic, galvanising, zinc, sprayed metal (aluminium or zinc), etc. on steel, cast iron, ferritic and duplex stainless steel, substrates etc.

Non-Ferrous (N) operation using eddy current probes for non-conductive coatings on non-ferrous metal substrates, e.g. anodising, paint, powder, lacquer, plastic, etc. on aluminium, brass, zinc, stainless steel, copper, titanium substrates etc.

Dual (FNF) operation combines the Ferrous and Non-Ferrous operation in a single probe. The gauge has user selection for auto or manual substrate determination.

Video



YouTube Video - How to calibrate the Elcometer 456 Scan Probe (Click on the image to the left to view the video)

Calibrating the Elcometer 456 Coating Thickness Gauge with Ultra / Scan Probe is really easy. Simply select the Auto Repeat Mode and follow the on-screen prompts to ensure the highest level of measurement accuracy. The Elcometer 456's patented offset feature ensures any cap wear during use is incorporated within the calibration procedure.

Total Quality Assurance

(see separate Datasheet for more info)

Professional inspection reports provide a competitive advantage in today's industrial environment.

ElcoMaster® Data Management Software is a fast, easy to use software solution for all your reporting requirements.



Elcometer ElcoMaster® Data Management Software at a Glance:

- **Easy to connect** - Using the ElcoMaster® gauge wizard, connecting a gauge & downloading data (via Bluetooth or USB) is fast and easy
- **Import existing reports** - Scan your existing report into ElcoMaster® and drag & drop all your data where you want it, then simply save and print
- **Export, print or send** - Export, print, .pdf or email directly from ElcoMaster® at the click of a button
- **Cloud** - Multi-site access through secure cloud

What ElcoMaster® can do:

- Import and combine measurements via Bluetooth or USB from a full range of Elcometer gauges, including:
 - Surface Profile
 - Salt Contamination
 - Climatic Conditions
 - Oven Data Logging
 - Coating Thickness
 - Corrosion Thickness
 - Adhesion Testing
 - Gloss Measurements
- No need to learn different software for different gauges, all Elcometer products use the same expert platform
- Store data in a simple file tree, by project and by inspection type
- Easy on screen analysis with histograms, statistics, measurements, limits, notes, diagrams and photographs
- Export data direct to Microsoft Excel. csv. txt. Cqatk formats etc to save time and prevent keying in errors
- Generates reports instantly using standard or pre-designed templates in seconds. No need for data manipulation simply connect the gauge, download data and drag & drop
- Combine multiple inspection parameters (such as DFT, profile, climate, adhesion and gloss) together with images, notes and other project specific information in bespoke quality reports to set you apart from the competition



In many industries multiple sites/locations/production lines are used to fabricate the product components which are brought together at the final assembly line. Different inspection parameters all need to be combined to approve the final product. Using Cloud technology ElcoMaster® gives you real time quality control monitoring inspection projects in any location.