

elcometer 456 Dry Film Thickness Gauge



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" 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



Bigfoot™ integral probe for accurate and repeatable measurements



Ergonomic design for comfort during continuous use



2.4" colour screen provides enhanced reading visibility at all angles

The new Elcometer 456 makes measuring coating thickness faster, reliable and accurate. Over 60 years of product design experience has gone into the development of this gauge. We think you will agree that the new Elcometer 456 is something special.

Designed with you in mind

Whilst others have tried to emulate the Elcometer 456 we have continued to develop features to make the new Elcometer 456 even more powerful, rugged and easier to use.

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

Easy

- Repeatable and reproducible
- 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

- Measurement capability to $\pm 1\%$
- Conforms to 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
- 1 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 to IP65
- Scratch and solvent resistant display
- Durable gauge and probe construction
- Suitable for use in harsh environments
- Drop tested to 2m

Efficient

- Fast reading rate of 70+ per minute
- Multiple calibration memories
- Alpha numeric batch identification
- User selectable calibration methods
- Compatible with all Elcometer software including ElcoMaster 2.0



Powerful

- Wide range of interchangeable probes
- USB and data output
- Stores up to 75,000 readings in 999 batches
- Measures up to 30mm of coating on metal substrates

Product Features

	● Standard ○ Optional			
	Model E	Model B	Model S	Model T
Fast, accurate reading rate; <i>70+ readings per minute</i>	●	●	●	●
Repeatable & reproducible measurements	●	●	●	●
Easy to use menu structure; <i>in 25+ languages</i>	●	●	●	●
Tough, impact, water & dust resistant; <i>equivalent to IP65</i>	●	●	●	●
Bright colour screen; <i>with permanent back light</i>	●	●	●	●
Scratch & solvent resistant display; <i>2.4" (6cm) TFT</i>	●	●	●	●
Large positive feedback buttons	●	●	●	●
USB power supply; <i>via PC</i>	●	●	●	●
Test certificate	●	●	●	●
2 year gauge warranty	●	●	●	●
Automatic rotating display; <i>0°, 90°, 180° & 270°</i>		●	●	●
Ambient light sensor; <i>with auto brightness adjust</i>		●	●	●
Emergency light mode		●	●	●
Gauge software updates ¹ ; <i>via ElcoMaster 2.0 software</i>		●	●	●
Data output		●	●	●
USB; <i>to computer</i>		●	●	●
Bluetooth [®] ; <i>to computer, pda or mobile phone</i>		●	●	●
On screen statistics		●	●	●
Number of readings; <i>n</i>		●	●	●
Mean (average); <i>x</i>		●	●	●
Standard deviation; <i>ó</i>		●	●	●
Highest reading; <i>hi</i>		●	●	●
Lowest reading; <i>lo</i>		●	●	●
Coefficient of variation; <i>COV</i>		●	●	●
Elcometer index value ² ; <i>EIV</i>		●	●	●
Nominal dry film thickness; <i>NDFT</i>		○	●	●
IMO PSPC; <i>%>NDFT, %>90<NDFT, 90:10 pass/fail</i>			●	●
High & low limits; <i>definable audible & visual alarms</i>			●	●
Number above high limit;			●	●
Number below low limit;			●	●
ElcoMaster 2.0 software & USB cable		○	●	●
Alarm; <i>daily (d), interval (i)</i>			d	d, i
Replaceable screen protectors	○	○	●	●
Leather effect protective case	○	●	●	●
Plastic transit case	○	○	○	●
Integral models; <i>with automatic gauge switch on</i>	●	●	●	●
Probe type; <i>Ferrous (F), Non-Ferrous (N), Dual (FNF)</i> ³	F, FNF	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range	0-1500µm	0-13mm	0-1500µm	0-1500µm
Separate models; <i>with automatic probe recognition</i>		●	●	●
Probe type; <i>Ferrous (F), Non-Ferrous (N), Dual (FNF)</i> ³	F, FNF	F, N, FNF	F, N, FNF	F, N, FNF
Measurement range		0-30mm	0-30mm	0-30mm
On-screen calibration instructions; <i>in 25+ languages</i>	●	●	●	●
Multiple calibration methods	●	●	●	●
Factory; <i>resets to the factory calibration</i>	●	●	●	●
2-point; <i>for smooth and rough surfaces</i>	●	●	●	●
1-point; <i>zero calibration</i>		●	●	●
Zero offset ⁴ ; <i>for calibration according to ISO19840</i>			●	●
Predefined calibration & measurement methods			●	●

ISO, SSPC PA2, Swedish, Australian			•	•
Automatic calibration; <i>for rapid calibration</i>			•	•
Calibration memory type; <i>gauge (g) or gauge & batch (gb)</i>	g	g	gb	gb
Number of batches; <i>with unique calibrations</i>			1	999
Calibration memories; <i>3 user-programmable memories</i>				•
Measurement outside calibration warning				•
Calibration lock				•
Delete last reading				•
Gauge memory; <i>number of readings</i>		5	750	75,000
Individual batch calibrations; <i>sent to PC via ElcoMaster 2.0</i>			•	•
Limits; <i>user definable audible & visual pass/fail warnings</i>			•	•
Gauge (g) or gauge & batch specific (gb) limits			g	gb
Date and time stamp			•	•
Batch types; <i>normal, counted average, IMO PSPC</i>			•	•
Review, clear & delete batches			•	•
Copy batches and calibration settings				•
Alpha-numeric batch names; <i>user definable on the gauge</i>				•
Fixed batch size mode; <i>with batch linking</i>				•

1 Internet connection required 2 Elcometer Index Values are used in the automotive industry to assess a coating's overall quality; USA patent number US7606671B2
3 FNF patent numbers UK: GB2306009B; USA: 5886522

Technical Specifications

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
Gauge dimensions (h x w x d)	140 x 720 x 450mm
Gauge weight	154g including supplied batteries
Operating temperature	-10 to 50°C
Packing list	Elcometer 456 gauge and probe (for separate probe models), calibration foils, 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 2.0 software (S, T)

Can be used in accordance with ⁶:

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 2360, ISO 2808-6A, ISO2808-6B, ISO 2808-7C, ISO 2808-7D, ISO 2808-12, NF T30-124, SSPC PA 2, US Navy PPI 63101-000, US Navy NSI 009-32

4 Zero Offset USA patent number US6243661 5 Using default settings & lithium batteries supplied, alkaline or rechargeable batteries may differ
6 Bold standards denote current standards, those in grey have been superceded but are still recognised by 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 etc • MAJOR Industrial Painters eg. RJ Southey • Gordon Bennett etc • Paint Manufacturers : Plascon • Dulux • Dekro etc • 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 & Others • 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 Association • SAPITI

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.

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.

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*'.

The Language of Coatings

In selecting the most 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 will be Ferrous, if it does not, then the substrate 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

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 accurate single handed measurements on large surface areas, pipes, etc.)
- 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.

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:

- *Entry Level Gauge* - no simple statistics, memory or data output
- *Basic Gauge* - with simple statistics, memory of 5, Bluetooth output and optional USB
- *Standard Gauge* - with statistics, links via Bluetooth or USB, limited memory (750 readings) in one batch
- *Top Gauge* - with statistics, links via Bluetooth or USB, enhanced memory (75,000 readings), batching 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.

The Elcometer 456 Integral & Separate model range



The Elcometer 456 is available in four different models: E, B, S and T. Each gauge provides the user with increasing functionality - from the entry level Elcometer 456 E, 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. See pages 11-13 for more details.

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.

Integral Model Options

Scale 1

Range: 0-1500µm

Accuracy : ±1-3% or ±2.5µm

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

	<u>Model E</u>	<u>Model B</u>	<u>Model S</u>	<u>Model T</u>
Elcometer 456 Ferrous Integral	A456CFE11	A456CFB11	A456CFS11	A456CFT11
Elcometer 456 Non-Ferrous Integral	-	A456CNB11	See separate gauges with F2 PINIP Probe™	
Elcometer 456 Dual FNF Integral	A456CFNFE11	A456CFNFB11	A456CFNFS11	A456CFNFT11

Scale 2

Range: 0-5mm

Accuracy : ±1-3% or ±20µm

Resolution: 0.1µm: 0-1mm; 10µm: 1-5mm

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

	<u>Model E</u>	<u>Model B</u>	<u>Model S</u>	<u>Model T</u>
Elcometer 456 Ferrous Integral	-	A456CFB12	See separate gauges with F2 PINIP Probe™	

Scale 3

Range: 0-13mm

Accuracy : ±1-3% or ±50µm

Resolution: 0.1µm: 0-2mm; 10µm: 2-13mm

	<u>Model E</u>	<u>Model B</u>	<u>Model S</u>	<u>Model T</u>
Elcometer 456 Ferrous Integral	-	A456CFB13	See separate gauges with F2 PINIP Probe™	

Separate Model Options

	<u>Model E</u>	<u>Model B</u>	<u>Model S</u>	<u>Model T</u>
Elcometer 456 Ferrous Separate	-	A456CFBS	A456CFSS	A456CFTS
Elcometer 456 Non-Ferrous Separate	-	A456CNBS	A456CNSS	A456CNTS
Elcometer 456 Dual FNF Separate	-	A456CFNFBS	A456CFNFSS	A456CFNFTS

See separate leaflet for all the Separate Probe model options