Dakota NDT
an Elcometer company



CX Series

Thickness Gauges

STANDARDS:
ASTM E 797, EN 14127, EN 15317

Bluetooth® wireless technology

compatible with DakMaster™

HIGHLIGHTS:

- Stores up to 100,000 readings in up to 1,000 sequential batches
- Selectable reading rate of 4, 8, 16Hz (4, 8, 16 readings per second)
- Scan Mode at 16Hz, ideal for measuring a large surface area
- User selectable reading resolution; 0.1mm (0.01") or 0.01mm (0.001")
- Pulse Echo (PE), Echo Echo ThruPaint™ & Velocity (VM) measurement modes
- Hi & Lo limit indicators provides indication of problem areas
- Integrated zero disc, ensures maximum accuracy

Dakota CX

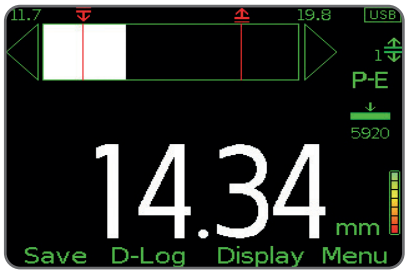
Ultrasonic Material Thickness Gauge



Easy to use with minimum set up



Coatings up to 2mm (0.0787”) (80mils) can be ignored



Customisable reading display



Set user definable limits for audible and visual pass/fail warnings


Connect the gauge via Bluetooth® or USB to PC

Accurate

A range of calibration options for accuracy and efficiency

The CX gauges have a range of calibration options including calibrations, preset material list, Velocity, 1 and 2 point, velocity for a known thickness (VM or Nodularity). Users can also select one of 39 pre-set materials stored within the gauge or store up to three calibrations into the memory.

Versatile

Measures uncoated & coated surfaces

Flexible & easy to use, the Dakota CX range doesn’t just measure uncoated surfaces but can also measure coated surfaces. Using Echo Echo ThruPaint™ Mode (EE), coatings up to 2mm (0.0787”) (80mils) are ignored.

Customisable

Choose & customise the reading display

The Dakota CX range has a choice of display modes allowing the user to select the most appropriate for their needs; Readings, Selected Statistics, Bar Graph, Run Chart, B-Scan & Differential Mode.

Intelligent

User definable limits for pass/fail indication

Users are able to set upper and lower limits with audible and visual pass/fail warnings. Limits can be set for individual readings or for each batch.

Wireless Connectivity

Connect to any PC

Compatible with DakMaster™ PC, readings can be downloaded via USB or Bluetooth® to PC for further analysis and reporting.

Dakota CX

Ultrasonic Material Thickness Gauge

User Definable Upper and Lower Limits



The CX gauges have user definable upper and lower limits with audible and visual pass/fail warnings allowing the user to compare readings to pre-defined values. The CX8 can store up to 40 pre-programmed limits which can be set for individual readings or for each batch.

If a measurement is taken which falls outside set limits, the reading value and the limit icon turn red, the red LED flashes and the alarm beeps providing immediate indication of problem areas.

A Range of Calibration Methods



1 Point; after setting the zero point a reading is taken and adjusted on an uncoated sample piece of test material of a known thickness. Once the thickness has been entered and confirmed, the derived sound velocity is displayed.

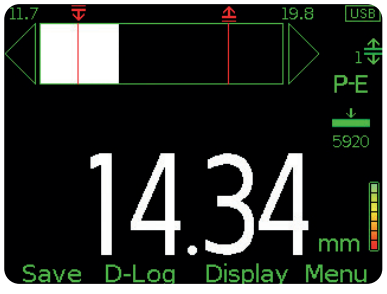
2 Point; readings are taken and adjusted on two uncoated sample pieces of test material with known thicknesses. Once the second thickness has been entered and confirmed, the derived sound velocity is displayed.

Material; calibration using the sound velocity of a material, selected from a pre-defined list of materials stored in the gauge.

Velocity; calibration using the known sound velocity of the material under test.

Thickness Set; calibration is performed using the known thickness of the material under test. Up to three calibrations can also be saved in the gauge memory. Once saved, the user can select the calibration memory - without the need to re-calibrate the gauge.

Scan Mode



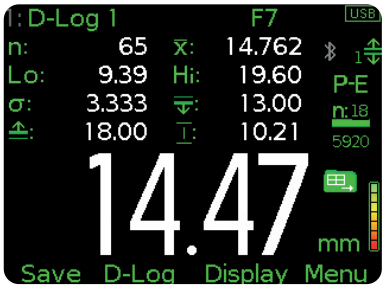
When enabled, users can slide the transducer over a large surface area whilst the gauge takes readings at a rate of 16Hz (16 readings per second). During each scan, the live thickness is displayed together with an analogue bar graph showing the thickness relative to the set nominal value and any user defined limits, with audible and visual warnings if any readings fall outside the set limits.

When the transducer is lifted off the surface, the average, lowest and highest thickness value is displayed making scan mode ideal for checking a sample's overall uniformity.

Dakota CX

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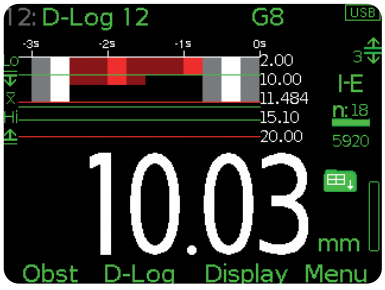
Sequential or Grid Batching



Individual readings can be stored in up to 1,000 sequential or grid type, alpha-numeric batches, together with date and time stamp and reading location*. Users have the option to view batch readings, statistics and a graph of all readings stored within the batch.

The obstruction feature (Obst), allows the user to record areas of obstruction on the grid where measurements could not be taken.

B-Scan Reading



A time based, cross sectional 2 dimensional B-Scan provides a graphical view of the material under test, ideal for relative depth analysis.

The zoom of the B-Scan reading can either be set to automatic or can be defined by the user to focus on areas of interest.

Differential Mode



Once a user defined nominal thickness value has been set, the gauge displays the measured thickness together with the variation from the set nominal value thus indicating areas of the material which are thinner or thicker than expected.

Velocity Mode

Velocity mode measures the speed of sound of materials and is ideal for determining the homogeneity of a material/alloy and the correct velocity of a material for calibration.

* Grid batches only

Dakota CX — Ultrasonic Material Thickness Gauge

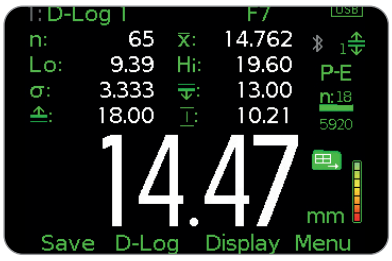
A choice of display and measurement modes

Readings



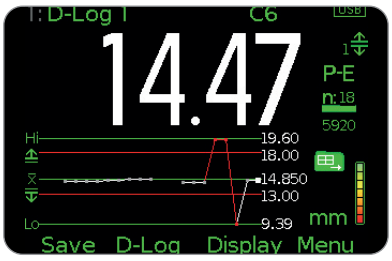
The reading value is displayed.

Selected Statistics



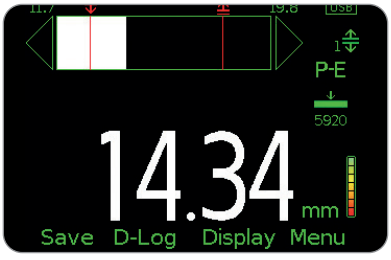
Up to 8 statistical values can be displayed as defined by the user.

Run Chart



A line trend graph of the last 20 measurements which is updated after each reading.

Bar Graph



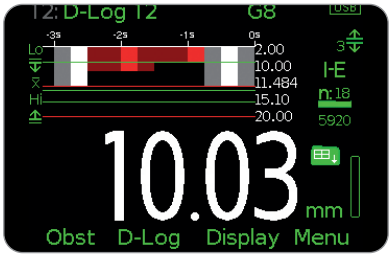
An analogue representation of the current measurement value together with the highest (Hi), lowest (Lo) and average (x̄) reading.

Readings & Differential



The last reading is displayed together with the variation from the nominal value (if set).

B-Scan



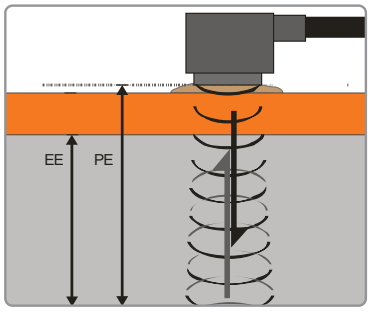
A cross-sectional view of the material being tested is displayed along with readings taken, saved readings, highest (Hi), lowest (Lo) and average (x̄) reading and upper/lower limit values (if set).

Measurement Modes

Pulse Echo (PE); the total thickness from the base of the transducer to the material density boundary (typically the back-wall) is measured. Suitable for measurement of materials between 0.63mm and 500mm (0.025” to 20”) thick.

Echo Echo ThruPaint™ (EE); a coating of up to 2.0mm (0.08”) thick is ignored and the material thickness from the top surface of the material to the material density boundary (typically the back-wall) is measured. Suitable for measurement of materials between 2.54mm and 25.4mm (0.1” to 1.0”) thick.

Velocity Mode (VM); measures the speed of sound of the material. Ideal for measuring the homogeneity of a material/alloy.



Dakota CX — Ultrasonic Material Thickness Gauge

Product Features

Model Number	CX2	CX4	CX8-DL
Easy to use menu structure in multiple languages	■	■	■
Tough, impact, waterproof and dust resistant equivalent to IP64	■	■	■
Bright colour screen with permanent backlight	■	■	■
Ambient light sensor, with adjustable brightness	■	■	■
Scratch and solvent resistant display; 2.4" (6cm) TFT	■	■	■
Large positive feedback buttons	■	■	■
USB power supply via PC	■	■	■
Gauge software updates[1] via DakMaster™ Software	■	■	■
2 year gauge warranty[2]	■	■	■
Limits: 40 definable audible & visual pass/fail warnings			■
Measurement Mode			
Pulse Echo (PE)	■	■	■
Echo Echo ThruPaint™ (EE)[3]		■	■
Velocity Mode (VM)			■
Measurement Rate			
4, 8, 16Hz	4Hz	4Hz	4, 8, 16Hz[4]
Gain			
Low, Medium, High			■
Thickness Range[5]			
PE 0.63-500mm (0.025-19.999")	■	■	■
EE 2.54-25.4mm (0.100-1.0”)		■	■
Measurement Units			
mm or inches	■	■	■
m/s, inch/µs			■
Repeatability / Stability Indicator	■	■	■
Display Mode			
Reading	■	■	■
Selected statistics			■
Scan thickness bar graph			■
Run Chart			■
Readings and Differential			■
B-Scan cross sectional display			■
Selectable Reading Resolution			
Lo; 0.1mm, 0.01 Inch, 10m/s, or 0.001 in/µs	■	■	■
Hi; 0.01mm, 0.001 Inch, 1m/s, or 0.0001 in/µs			■

[1] Internet connection required.

[2] The Dakota CX range is supplied with a 1 year warranty against manufacturing defects. The warranty can be extended free of charge to 2 years within 60 days of purchase via www.DakotaNDT.com.

[3] HD transducer is required. [4] User selectable default setting in Scan Mode is 16Hz.

[5] Dependent on the material being measured and the transducer being used.

Dakota CX — Ultrasonic Material Thickness Gauge

Product Features

Model Number	CX2	CX4	CX8-DL
Statistics			
Number of readings,n; Mean average, $\bar{x}$; Standard deviation, σ.			■
Lowest reading, Lo; Highest reading, Hi			■
Low / high limit value			■
Reading range value			■
Nominal value			■
Number of readings below the low limit			■
Number of readings above the high limit			■
Calibration Options			
Zero (using the integral zero disc)	■	■	■
1 - point		■	■
2 - point			■
Material selection; 39 preset materials*		■	■
Factory; resets to the factory calibration		■	■
Velocity (speed of sound)			■
Known thickness value			■
Calibration Features			
Calibration lock; with optional PIN Lock			■
Test calibration feature			■
Calibration memories: 3 programmable memories			■
Measurement outside calibration warning			■
Data Logging			
Number of readings			100,000
Number of batches			1,000
Sequential batching			■
Grid batching			■
Fixed Batch Size Mode; with batch linking			■
Obstruct entry; add 'obst' into grid location			■
Delete last reading			■
Date & time stamp			■
Review, clear & delete batches			■
Alpha numeric batch names; user definable			■
Batch review graph			■
Data Output			
USB to PC	■	■	■
Bluetooth® to PC			■
DakMaster™ Software	■	■	■
Transducer Probe Type			
Dual Element	■	■	■
Auto V-path correction	■	■	■

* See page 1-11 for lists of preset materials.

Dakota CX — Ultrasonic Material Thickness Gauge

Technical Specification

Part Number	Description	Certificate
CX2	Dakota CX2 Ultrasonic Material Thickness Gauge	●
CX4	Dakota CX4 Ultrasonic Material Thickness Gauge	●
CX8-DL	Dakota CX8-DL Ultrasonic Material Thickness Gauge	●

Model Number	CX2	CX4	CX8-DL
Measurement Range[1]			
Pulse Echo (PE)	0.63-500mm (0.025-19.999”)	0.63-500mm (0.025-19.999”)	0.63-500mm (0.025-19.999”)
Echo Echo ThruPaint™ (EE)		2.54-25.4mm (0.100-1.0”)	2.54-25.4mm (0.100-1.0”)
Velocity Mode (VM)		1,250-10,000m/s (0.0492-0.3937in/µs)	1,250-10,000m/s (0.0492-0.3937in/µs)

Operating Temperature	-10 to 50°C (14 to 122°F)
Power Supply	2 x AA batteries
Battery Life[2]	Alkaline: 15 hours Lithium: 28 hours
Gauge Weight	210g (7.4oz) - including batteries, without transducer
Gauge Dimensions	145 x 73 x 37mm (5.7 x 2.84 x 1.46”), without transducer
Packing Lists	Dakota CX2 Ultrasonic Material Thickness Gauge, ultrasonic couplant, carry pouch, screen protector, wrist harness, 2 x AA batteries, operating instructions, test certificate, DakMaster™ software download card
	Dakota CX4 Ultrasonic Material Thickness Gauge, ultrasonic couplant, carry pouch, screen protector, wrist harness, 2 x AA batteries, operating instructions, test certificate, DakMaster™ software download card
	Dakota CX8-DL Ultrasonic Material Thickness Gauge, ultrasonic couplant, plastic transit case, 3 x screen protectors, wrist harness, 2 x AA batteries, operating instructions, calibration certificate, DakMaster™ software download card & USB cable

● Calibration Certificate supplied as standard.

[1] Dependent on material being measured & transducer being used.

[2] Approximate battery life, when in Continuous Reading Mode at a reading rate of 4Hz. Rechargeable batteries may differ.

Dakota CX

Material Thickness Transducers



Suitable for:
CX2
CX4
CX8-DL



Disk	Part Number	Probe Diameter	Probe Characteristic	Damping*	ThruPaint™	Connector Type: Potted	Connector Type: Top	Connector Type: Side	Suitable for: CX2	Suitable for: CX4	Suitable for: CX8-DL
	1.00MHz Dual Element Thickness Transducer										
●	T-104-0000	½"	Standard	S		•		•		•	•
	5.00MHz Dual Element Thickness Transducer										
●	T-102-2000	¼"	Standard	S		•		•	•	•	•
●	T-042-2700	¼"	Hi Temp	S		•	•			•	•
	7.50MHz Dual Element Thickness Transducer										
●	T-101-3900	3⁄16"	Standard	S		•		•		•	•
●	T-102-3300	¼"	High Resolution	S		•		•		•	•

* Damping: **S** - Standard undamped Transducer, **H** - Highly Damped Transducer

All transducers are supplied with a calibration certificate.

Dakota CX Accessories

Couplant

Part Number	Description
V-000-0001	Ultrasonic Couplant; 120ml (4fl oz) bottle
V-000-0002	High Temperature Ultrasonic Couplant; 60ml (2fl oz)
V-000-0003	Ultrasonic Couplant; 360ml (12fl oz) bottle
V-000-0004	Ultrasonic Couplant; 4.5L (1 gallon)

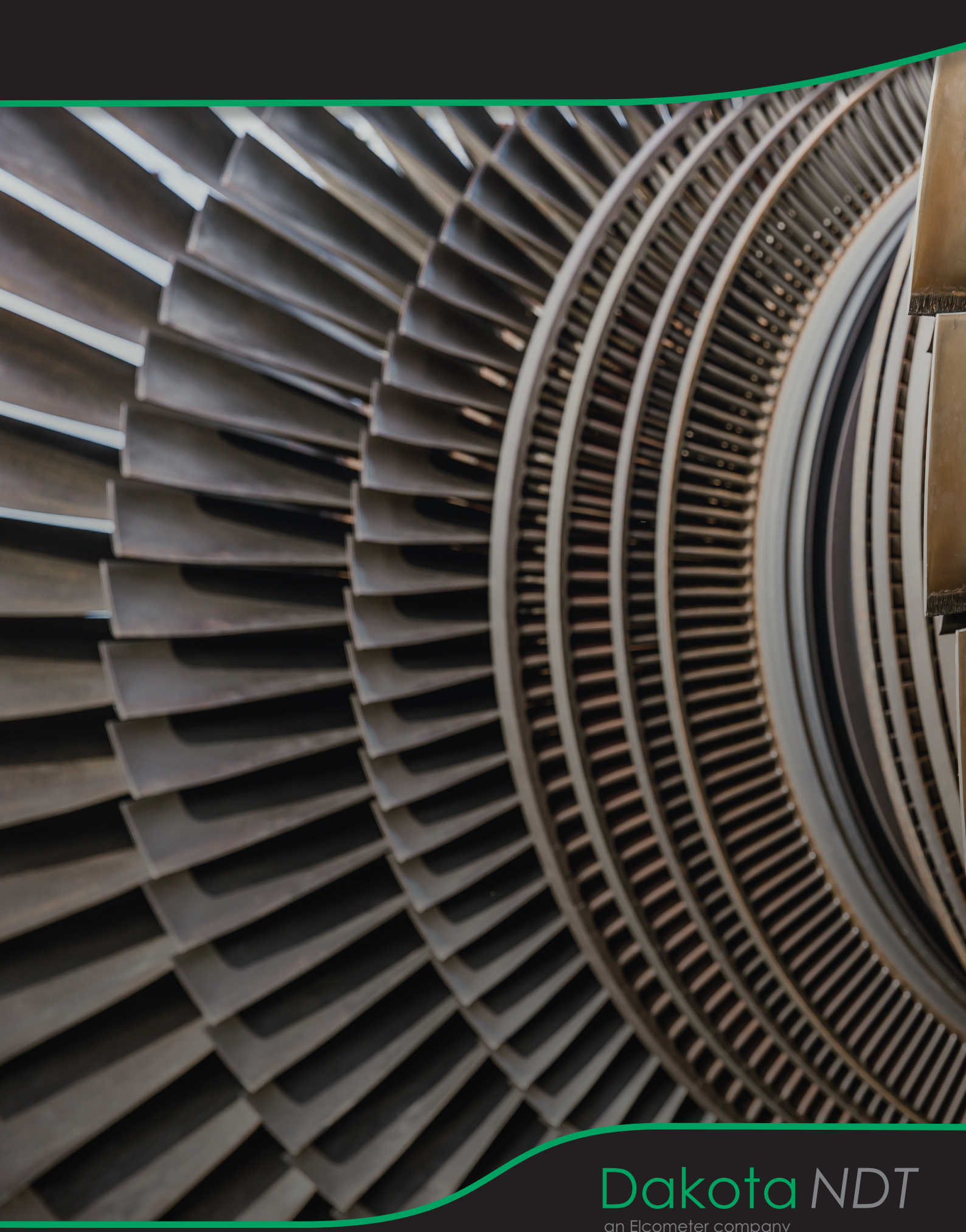
Calibration Blocks

Part Number	Description
X-000-0001	4340 Steel Calibration Block 5 Step - .100” to .500”
X-000-0002	4340 Steel Calibration Block 4 Step - .250 to 1.0”
X-000-0022	1018 Steel Calibration Block 5 Step – 2.5 – 12.5mm
X-000-0021	1018 Steel Calibration Block 4 Step – 6.25 – 25.0mm

Dakota CX — Ultrasonic Material Thickness Gauge

Velocity Chart for the preset choice of 39 materials in the Dakota CX

Elcometer Material Number	Material Description (Chemical Symbol/ Grouping)	Material Name	Sound Velocity (m/sec)	Sound Velocity (in/µsec)	Source of Value NPL = National Physics Laboratory ASNT = The American Society for Non destructive Testing Industry = Industry knowledge
1	Fe	Iron (soft)	5960	0.235	NPL
2	Fe	Iron Cast	4990	0.196	NPL
3	Al	Aluminium (7075-T6)	6350	0.250	ASNT
4	Ti	Titanium	6100	0.240	ASNT
5	Mg	Magnesium	5790	0.228	ASNT
6	Ni	Nickel	5630	0.222	ASNT
7	W	Tungsten	5180	0.204	ASNT
8	Cu	Copper	4660	0.183	ASNT
9	Zn	Zinc	4190	0.165	NPL
10	Ag	Silver	3600	0.142	Industry
11	Sn	Tin	3380	0.133	NPL
12	Pt	Platinum	3260	0.128	NPL
13	Au	Gold	3240	0.128	NPL
14	Cd	Cadmium	2780	0.109	NPL
15	Bi	Bismuth	2180	0.086	Industry
16	Pb	Lead	2160	0.085	ASNT
17	Cobalt-chromium Alloy	Stellite	6990	0.275	Industry
18	Iron Alloy	Steel (Carbon 1018)	5920	0.233	Industry
19	Iron Alloy	Steel (Alloy 4340)	5850	0.230	Industry
20	Nickel-chromium Alloy	Inconel (625)	5820	0.229	Industry
21	Silver Alloy	Stainless Steel, (Austenitic 304)	5660	0.233	ASNT
22	Copper Alloy	Constantan	5180	0.204	NPL
23	Copper-nickel Alloy	German Silver	4760	0.187	Industry
24	Copper-zinc Alloy	Brass (Naval)	4430	0.174	ASNT
25	Non-metal	Glass (Quartz)	5930	0.233	ASNT
26	Non-metal	Glass (Crown)	5660	0.223	NPL
27	Non-metal	Glass (Flint)	5260	0.207	NPL
28	Non-metal	Porcelain	5840	0.230	Industry
29	Non-metal	Plexiglas	2760	0.109	Industry
30	Non-metal	Fibreglass	2740	0.108	Industry
31	Non-metal	Nylon	2680	0.106	NPL
32	Non-metal	Epoxy Resin	2540	0.100	Industry
33	Non-metal	Polystyrene	2350	0.093	NPL
34	Non-metal	PVC	2330	0.092	NPL
35	Non-metal	Rubber (Butyl)	1830	0.072	Industry
36	Non-metal	Rubber (Natural)	1600	0.063	NPL
37	Non-metal	Polyurethane	1780	0.070	Industry
38	Non-metal	Teflon	1400	0.055	NPL
39	Non-metal	Water	1490	0.059	ASNT



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