



Certificate of Calibration

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Customer ; **Dimension Calibration Center Co.,Ltd.**
33/5-6 Moo. 4, Sukprayoon Road, Tambol Donhuaroh
Amphor Muang, Chonburi 20000.

Instrument ; Optical Parallel set

Manufacturer ;

Model ;

Serial no. ; 123456

Identification no. ; 456789

Reference no. ;

Date of received ; December 6, 2011

Date of Calibration ; December 10, 2011

Date of Issued ; December 20, 2011

Mr.Thanech Suksawat
Technician

Mr.Chatchapol Jirojjaturonn
Laboratory Manager

The calibration cover by this certificate have been performed in accordance with the requirement of ISO/IEC 17025: 2005.

The reported uncertainty is based on standard uncertainty multiplied by coverage factor $k = 2$ providing of confidence approximately 95%.

This calibration certificate may not be reproduced other than in full except with the permission of Director of Dimension Calibration Center Co.,Ltd.



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Reference standard instrument and traceability

Flatness Interferometer serial no.

Certificate no.	Date of Calibration	Next Calibration
0	January 0, 1900	January 0, 1900

Traceable to Nation Institute of Metrology (Thailand) through certificate no.

Reference Flate

Certificate no.	Date of Calibration	Next Calibration
0	January 0, 1900	January 0, 1900

Traceable to Nation Institute of Metrology (Thailand) through certificate no.

Universal Length Metro-scope serial no. 02101.

Certificate no.	Date of Calibration	Next Calibration
CC555-01-0098	January 22, 2012	January 2i, 2014

Traceable to Nation Institute of Metrology (Thailand) through certificate no. DE-0022-10.

Measurement method

Interferometry by Flatness interferometer and Universal Length Metro-scope (ULM) refer to JIB B 7430: 1977 and JIS B 7431: 1977 according to work instruction WI5-03-45.

Environment conditions

The measurement was carried out within ambient temperature of $(20 \pm 0.5) ^\circ\text{C}$ and relative humidity of $(55 \pm 10) \% \text{ RH}$.

Uncertainty of measurement

The uncertainty state is the expanded uncertainty which obtained by multiplying the standard uncertainty by coverage factor $k=2$. It has been determined in accordance with EA publication EA-4/02 "Expression of the Uncertainty of Measurement in Calibrations" and "Guide to the Expression of Uncertainty in Measurement (GUM)". The values of assigned presents within the range of values with probability of 95%.

Uncertainty of Flatness measurement	;	0.04	μm
Uncertainty of Parallelism Measurement	;	0.11	μm
Uncertainty of Thickness measurement	;	0.18	μm

Measurement data

Serial no.	Thickness (mm)	Flatness (μm)		Parallelism (μm)	Average Thickness (mm)
		Top	Bottom		
18372	12.00	0.05	0.05	0.02	12.0026
83955	12.12	0.05	0.04	0.04	12.1233
83963	12.25	0.07	0.05	0.11	12.2523
83950	12.37	0.06	0.07	0.04	12.3765



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Optical Parallels Surface plot

Top Surface	
Serial no.	18372
Top Surface	
Serial no.	83955
Top Surface	
Serial no.	83963
Top Surface	
Serial no.	83950

Bottom SurFace	
Serial no.	18372
Bottom SurFace	
Serial no.	83955
Bottom SurFace	
Serial no.	83963
Bottom SurFace	
Serial no.	83950

End Certificate