

# DAVID L. ELLIS COMPANY, INC.



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*Certificate of Calibration and Conformance  
for  
Micro Indentation Vickers Test Block*

**Certificate No.**  
168

<b>Date Calibration</b>	22 January 2019	<b>Temp</b>	23 C
<b>Hardness</b>	191 HV ave	<b>Operator</b>	MKP
<b>Serial No.</b>	168	<b>Code</b>	P
<b>Load gf</b>	500	<b>Force N</b>	4.9035
<b>Unc block</b>	7.2 HV	<b>Method</b>	E92-17,E384-17
		<b>Humidity</b>	20%
		<b>Tol+/-HV</b>	7.4
		<b>Ave/stdev <math>\mu</math>m</b>	69.7 0.644
		<b>Tol+/-<math>\mu</math>m</b>	1.4

**Indent Map**



**Group 1**

$\mu$ m	HV
69.0	195
69.9	190
70.3	188
69.2	194
70.0	189

**Group 2**

$\mu$ m	HV
68.3	199
69.1	194
70.4	187
69.6	191
69.5	192

**Group 3**

$\mu$ m	HV	MAG
70.3	188	40x
68.8	196	
68.9	196	
69.7	191	
70.6	186	

**Group 4**

$\mu$ m	HV
69.5	192
70.0	189
70.8	185
69.8	190
70.1	189

**Group 5**

$\mu$ m	HV
69.7	191
70.5	187
70.7	185
69.7	191
69.8	191

**Group Ave**

Hardness	HV	STDEV	$\mu$ m
Group 1	191	3.0	69.7
Group 2	193	4.3	69.4
Group 3	191	4.5	69.6
Group 4	189	2.6	70.0
Group 5	189	2.6	70.1

<b>Hardness</b>	191	<b>HV 0.5</b>	<b>Uncertainty</b>	+/-	7.2 HV	<b>K=2</b>
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The above calibration was verified with the following equipment, which is traceable to NIST or PTB.

United Calibration  
Serial No.: 284

Stage Micrometer in mm  
N.I.S.T. Test No.: NIST 5588

Standardizing Tester  
Serial Number FH006150140

Primary standard #2798 S/N C0003 Vickers

The standardized test blocks are calibrated in accordance with ASTM E384 and ASTM E92 annex A4 using NIST standard reference material (SRM) #1895 and standards from PTB. All other indenter/loads combinations are traceable to Ellis hardness levels through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E92 annex A2 using devices that are traceable to NIST either directly or through a NVLAP approved laboratory.

Expanded uncertainty uses coverage factor K=2, providing a confidence level of approximately 95%.

This test report is not to be used to claim product certification, approval or endorsement by the David L. Ellis Company Inc., NIST, NVLAP or any government agency.

This block is calibrated according to A.S.T.M. E92 annex A4, ANSI (NCSL) Z540-1, (ISO) 10012, ISO/IEC 17025, by David L Ellis Co., Inc., NVLAP 200127-0 Calibration Laboratories.

Kim Purinton  
Representative

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