



# PENN UNITED<sup>®</sup>

## TECHNOLOGIES INC.

### CARBIDE DIVISION

Grade	Binder %	Hardness HRA	Hardness HV (10 kg)	Density (g/cm <sup>3</sup> )	Minimum Transverse Rupture Strength (PSI)	Approximate Compressive Strength (PSI)	Average Grain Size (μ)
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#### TUNGSTEN CARBIDE

##### FINE GRAIN (COBALT BINDER)

PUC-5	5%	92.5 - 94.0	NA	14.92 - 15.06	230,000	750,000	1-2
PUC-6	6%	91.0 - 92.2	1710 - 1865	14.88 - 15.02	260,000	690,000	1-3
PUC-9	9%	90.0 - 91.0	1556 - 1710	14.56 - 14.70	275,000	682,000	1-3
PUC-12	12%	89.0 - 90.0	1400 - 1556	14.26 - 14.40	350,000	660,000	1-3
PUC-13	13%	88.5 - 89.5	1323 - 1478	14.16 - 14.30	390,000	639,000	1-3
*PUC-15	15%	87.5 - 88.5	1190 - 1323	13.97 - 14.11	400,000	554,000	1-3

##### MEDIUM GRAIN (COBALT BINDER)

*PUC-11C	11%	88.5 - 89.5	1323 - 1478	14.36 - 14.50	425,000	650,000	2-4
*PUC-13C	-----	88.2 - 89.2	1245 - 1400	14.28 - 14.38	450,000	620,000	2-4

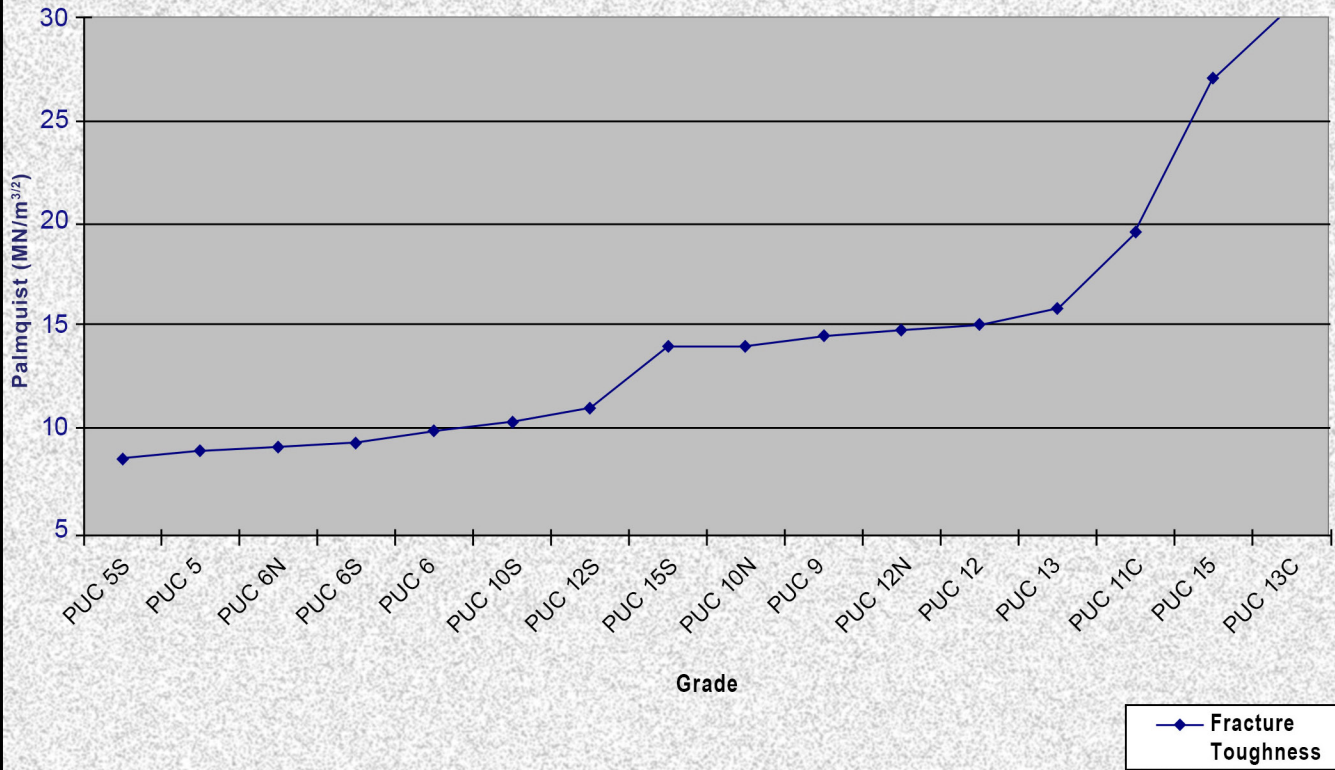
##### SUB-MICRON GRAIN (COBALT BINDER)

PUC-5S	5%	93.5 - 94.5	NA	14.94 - 15.08	300,000	910,000	0.5
PUC-6S	6%	92.0 - 93.0	1865 - 2000	14.88 - 15.02	325,000	880,000	0.8
*PUC-10S	10%	91.0 - 92.0	1710 - 1865	14.46 - 14.60	400,000	775,000	0.8
*PUC-15S	15%	89.0 - 90.0	1400 - 1556	13.97 - 14.11	450,000	650,000	0.8

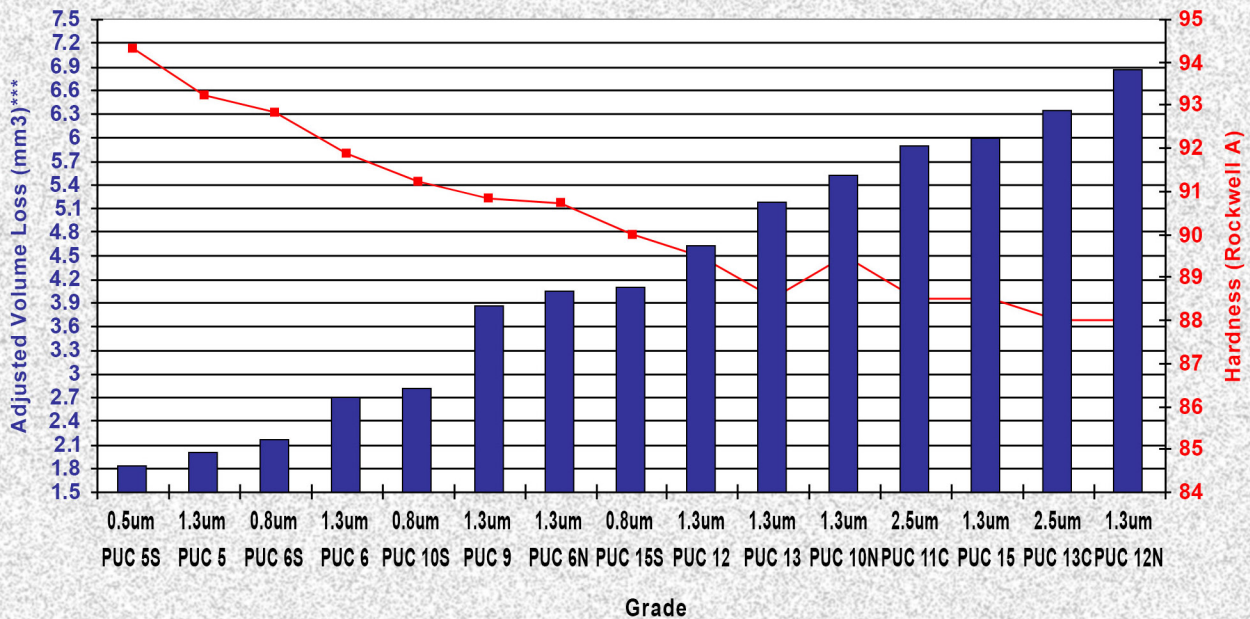
##### FINE GRAIN (NICKEL BINDER)

PUC-6N	6%	90.5 - 91.5	1633 - 1787	14.88 - 15.02	260,000	610,000	1-3
PUC-9N	9%	88.5 - 90.5	1323 - 1633	14.59 - 14.69	275,000	565,000	1-3
*PUC-10N	10%	89.0 - 90.0	1400 - 1556	14.46 - 14.60	275,000	550,000	1-3
*PUC-12N	12%	88.0 - 89.0	1245 - 1400	14.26 - 14.40	375,000	490,000	1-3

## Palmquist-Fracture Toughness Testing



## Comparison Between Wear, Hardness and Grain Size



PS-0002 Rev. 7

For Reference Only. Please reference our website for up to date literature and information.

\*-Penn United Grades available for EDM. Please specify when ordering any grade for EDM applications.

**MANUFACTURING SOLUTIONS. ABSOLUTE INTEGRITY. EMPLOYEE OWNED.**

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