

COOLERVIE

Wire Drawing Reference
Guide

Precision in Every Micron, Excellence in Every Die



Corporate Overview

Leading the Industry in Diamond Die
Technology

About Coolervie

Industry Leader

Coolervie has established itself as a global manufacturer of high-precision wire drawing dies and technical components for over two decades. We serve the world's leading cable and wire producers with unmatched technical expertise.

Global Presence

Operating from state-of-the-art facilities in China, we export to over 40 countries, providing localized support and rapid delivery cycles. Our commitment is total customer satisfaction through continuous process improvement.

Our Core Values



Precision

Achieving sub-micron accuracy in every bore to ensure perfect wire surface finish and diameter consistency.



Repeatability

Ensuring that every die in a set is identical to your exact defined specifications, every single time.



Expertise

Providing daily technical support and lifecycle management to optimize your drawing sequences.



Diamond Die Solutions

Natural and Synthetic Diamond Tooling

Natural Diamond Dies (SCND)

Single Crystal Natural Diamond dies are the gold standard for ultra-fine wire drawing and superior surface finish requirements.

- Maximum hardness and wear resistance.
- Highly polished surface for minimal friction.
- Ideal for high-value materials like gold, silver, and medical-grade wire.
- Cylindrical geometry for optimal flow.



Synthetic Diamond Dies (SCSD)

Single Crystal Synthetic Diamond dies provide the performance of natural diamond with enhanced consistency and structural stability.

- Uniform crystal orientation for predictable wear.
- Free from inclusions found in natural stones.
- Available in a wide range of controlled sizes.
- Cost-effective alternative for critical finishes.



Polycrystalline Diamond

PCD Technology

Our Poly-Di® polycrystalline diamond dies are engineered for heavy-duty applications where toughness and longevity are paramount.

PCD dies are comprised of diamond crystals fused together under high pressure, offering multi-directional wear resistance that prevents the channeling often seen in single crystals.



Nano Diamond Coated Dies

NDCD technology combines the toughness of Tungsten Carbide with the hardness of diamond through a specialized coating process.

- Extends die life by up to 10–20 times versus standard WC dies.
- Superior surface finish on non-ferrous wires.
- Reduces power consumption due to low friction.
- Excellent for aluminum and bare copper drawing.





Specialty Tooling

Hard Material Components for Every
Process

Tungsten Carbide Dies (WC)

Coolervie Tungsten Carbide dies are manufactured using high-grade sub-micron powders for maximum impact strength and density.

- Available in R-series and custom geometries.
- Highly resistant to galling and corrosion.
- Precision ground casings for perfect alignment.
- The reliable choice for steel wire and large diameters.



Extrusion Tips & Dies

Accurate insulation application requires consistent extrusion tooling. Coolervie tips are guaranteed concentric within 0.005mm.

- Custom designs for all extrusion heads.
- Diamond inserts for high-speed line efficiency.
- Optimized flow profiles to reduce material waste.
- Available in Tool Steel, Carbide, and Diamond.



Custom Shaped Dies



Square & Rectangular

Precision corner radii down to 0.1mm for busbars and flat wire.



Oval & Half-Round

Symmetrical profiles for specialty welding and connector pins.



Hexagonal

Perfect for fastener production and high-tolerance profiles.



Technical Data

Reference Charts and Industry
Standards

AWG Reference (Inches)

Gauge	Full Size (in)	Half Size (in)	Copper (lb/1000 ft)
4/0	0.4600	-	640.16
1	0.2893	0.2730	253.20
10	0.1019	0.0962	31.41
20	0.0320	0.0302	3.09
30	0.0100	0.0095	0.304

AWG Reference (Metric)

Gauge	Full Size (mm)	Half Size (mm)	Copper (g/m)
4/0	11.6840	-	952.68
1	7.3481	6.9343	376.81
10	2.5882	2.4424	46.75
20	0.8118	0.7661	4.60
30	0.2546	0.2403	0.45

Hardness Trend: Synthetic Diamond



Hardness variation in Synthetic vs Natural crystals based on nitrogen content.

Relative Die Life (Copper Wire)



Estimated service life multiples relative to standard Tungsten Carbide dies.



Wire Drawing Mechanics

Engineering Formulas and Calculations

Elongation (E)

Definition

Elongation is the lengthening of the wire as it is drawn through the die, expressed as a percentage of the original length.

Crucial for matching machine speeds and preventing breaks.

Equation

$$E = 100 \times \frac{D}{d}^2 - 1$$

Reduction of Area (A_r)

Definition

Reduction of Area is the percentage decrease in the cross-sectional area of the wire occurring during the drawing process.
Used to calculate the mechanical load on the die nib.

Equation

$$A_r = 100 \times \left(1 - \frac{d^2}{D^2} \right)$$

Production Rate Calculation

Throughput Analysis

Calculating the weight produced per hour is vital for facility planning and cost estimation.

Variables: Wire speed (Vf), density (DN), and diameter (d).

Equation (Imperial)

$$WP = Vf \times d^2 \times DN \times 565.5$$

Velocity Relationship

Mass Balance

Since the volume of the wire remains constant, the velocity must increase as the cross-section decreases.

Velocity exiting (V_d) is significantly higher than velocity entering (VD).

Exit Velocity (V_d)

$$V_d = \frac{VD}{1 - (A_r / 100)}$$



Service & Maintenance

Maximizing Your Tooling ROI

Die Recutting Services

Extend Tool Life

Coolervie offers a comprehensive recutting service to expand worn dies to the next larger wire size, effectively recycling the diamond core. Each recut die is polished to the same sub-micron finish as a new tool.

Recut Capabilities

- SCND recutting to next half-AWG.
- PCD resizing up to D-36 blank sizes.
- Complete profile restoration.
- Fast 1-week turnaround.

Inspection Quality Grades



X Quality

Recut die may have minor cracks in drawing area but draws round wire without breakage.



XX Quality

May have slight imperfections in reduction area but the bearing zone is perfectly clean.



XXX Quality

Zero imperfections allowed in the entire drawing area. Essential for high-finish surface needs.

Process Optimization

We don't just sell dies; we optimize your factory flow. Our engineering team assists with matched elongation sets to minimize slip and maximize surface quality on your drawing lines.



Quality Control

Measuring Precision with Zero
Tolerance

Precision Measurement

Conoptica Lab


Coolervie utilizes the industry-leading Conoptica measurement systems for absolute validation of every die we produce.

- 3D profile measurement of internal angles.
- Digital bearing length verification.
- Automated ovality detection.
- Traceable digital inspection reports.



Questions?

Thank you for your interest in Coolervie Technology.

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