



DOWNHOLE DRILLING

MULTI-METALS

Multi-Metals controls the entire manufacturing process beginning with grade formulation. We incorporate a state-of-the-art powder processing plant to convert raw material into standard and custom grade formulations to meet industry and application-specific requirements. This capability allows us to maintain the tightest control possible on the metallurgy of the finished product.

Advanced technologies like injection molding as well as conventional compaction techniques are utilized to bring product to life. The most advanced robotics and process controls are implemented throughout our plant to ensure we deliver the product you specify and the quality you expect.

Process flexibility allows us to manufacture your product using the technology that serves you, our customer, the best. Our diverse sintering technologies include conventional vacuum, sinter-HIP (Hot Isostatic Press), and controlled-atmosphere, continuous-flow furnaces.

A complete metallurgical laboratory, featuring a Scanning Electron Microscope and an impressive array of other testing and analysis equipment, gives us the on-site capability to ensure that our quality standards are never compromised. Additionally, our technical expertise allows us to provide outstanding customer support in the form of failure analysis and process troubleshooting.

Customer satisfaction is our primary goal and our staff is among the most knowledgeable in the world. We support a multi-million dollar inventory spanning hundreds of part numbers allowing us to deliver your product quickly. We also offer custom stocking programs for non-standard items.



DYANITE®

Dyanite is our patented Tungsten Carbide and Cobalt (WC-Co) composition that fundamentally changes the compromise between hardness and fracture toughness.

Performance of rock drilling inserts is affected by their resistance to wear and fracture. Fracture toughness can be increased by increasing the carbide grain size and/or the Cobalt content. However, these microstructural changes also decrease the hardness of the carbide, thereby lowering its wear resistance. This classic interplay between fracture toughness and wear resistance has been fundamentally challenged with the invention of Dyanite.

Dyanite allows for the use of higher hardness inserts without sacrificing the fracture toughness needed in the most demanding rock drilling applications. The microstructure of Dyanite inserts is altered with the addition of a third alloy in the matrix, Boron (B). Unlike other third phases like eta, the Dyanite phase is not brittle and cracks have no preferred tendency to propagate through this phase.

Hardness and fracture toughness of Dyanite compositions have the same dependence on carbide grain size and cobalt content as standard WC-Co grades, but with one fundamental difference. For a given Cobalt content and grain size, Dyanite does not sacrifice hardness, but does provide a substantial increase in fracture toughness.

There are two ways to take advantage of Dyanite...First, in applications where fracturing is not a problem, we can increase the hardness of the inserts without giving up the fracture toughness that is currently performing satisfactorily, thus extending the life of your bit. And secondly, if fracturing is a problem, we can incorporate Dyanite into the current grade, increasing the fracture toughness of the insert by up to 40%. Again, the result is a longer lasting bit.

Dyanite has been proven time and again over the years to be the longest-lasting, highest quality carbide insert for rock drilling applications. Used around the world for water well drilling, blast hole/mining operations, oil/gas exploration, and construction drilling, Dyanite is what the top bit manufacturers turn to for the most demanding applications.

Cemented carbides have been used for decades. Dyanite was the last, and perhaps only, advancement in grade formulation that produces results to counter the dependence on grain size and cobalt content to determine fracture toughness. Call us to learn how we can extend the life of your product and produce extraordinary efficiency gains for your customers.



Optical micrograph showing the microstructure of Dyanite®

Grade	Hardness (Hra)	Avg. Fracture toughness (MPa \sqrt{m})		Improvement
		Standard	Dyanite®	
0M2	91.7	9.2	12.8	41%
1M2	91.0	10.8	13.3	25%
2M2	90.0	11.6	14.0	17%
1M13	88.7	12.4	14.7	16%



Designs

Shown below are some of the insert designs currently manufactured at Multi-Metals. In addition to these standard designs, we take pride in our capability and experience to custom-design an insert that is right for your application.

Tops

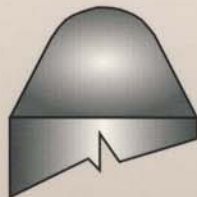
Conical



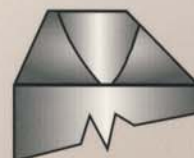
Flat



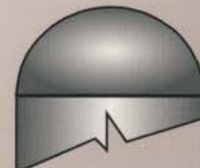
Ballistic



Chisel



Dome



Bottoms

Bottom 1



Bottom 2



Bottom 3



Grade Chart

Grade	Cobalt%	HRA	Density (g/cc)	TRS (PSI)
OM2	6.00	91.2-92.2	14.85-15.05	333,000
1M2	6.00	90.5-91.5	14.85-15.05	390,000
2M2	6.00	89.5-90.5	14.85-15.05	335,000
1M13	12.00	88.0-89.5	14.25-14.45	400,000

Other grades available

Terms & Conditions

1. Warranty: We will replace any material which is proven defective within 90 days after receipt of same by customer when properly used for the purpose specified in the order, but no claim for labor or damage will be allowed. Claims for errors must be made on receipt of material.
2. Over and Under Shipments: We reserve the right to over or under ship 10% of the specified quantity and orders will be closed out and invoiced with shortages or overages.
3. Terms and Conditions of all quotations are contingent upon strikes, accidents and other causes beyond our reasonable control.
4. Dies and tools used in manufacturing shall remain the property of Multi-Metals.
5. Material can only be returned after obtaining authorization. Returned material must be carefully packed and insured for shipment as we will not accept responsibility for damaged or lost product while enroute to us.
6. Special, non-standard items cannot be canceled or returned for exchange or credit. Standard items can only be returned after our consent is first obtained and after determining whether or not our standard 15% handling charge is applicable.
7. Modification: No terms or conditions, other than those stated herein, and no agreement or understanding in any way modifying the terms and conditions herein stated, shall be binding upon the seller unless made in writing and signed by the authorized sales agent.
8. Delivery: Estimated delivery is based on production time required to process order commencing with date order is received by us.
9. Verification of Credit Rating: Quotations are submitted subject to verification of a satisfactory credit rating.

WARNING TUNGSTEN CARBIDE/COBALT/NICKEL

Exposure to cobalt/nickel powder, to dust or to coolant mist from grinding this product may cause nose, throat, skin, or eye irritation, or temporary or permanent respiratory disease, which may lead to disability or death. If you experience any symptoms of these problems, such as tightness in chest, shortness of breath, coughing, wheezing, loss of appetite, or nausea, immediately discontinue exposure to the powder, dust or mist, consult a physician and advise physician you have been exposed to cobalt and/or nickel.

Avoid breathing powder, dust or coolant mist from grinding.

Avoid skin contact with powder, dust or coolant mist.

Use protective devices and adequate ventilation.

Keep dust level below OSHA and ACGIH levels.

Wash hands thoroughly after using and before smoking or eating.

Dispose of materials in accordance with local, state and/or Federal regulations.



Multi-Metals

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