

SAFETY OF CUTTING TOOL PRODUCTS

1. Use of Cutting Tool Products

Packages of Mitsubishi products carry a safety warning label. However, tools are not labelled with detailed warning indications. Please read the "Safety of Cutting Tool Products" in this catalogue before handling cutting tool products and cemented carbide materials. Moreover, as a part of your workers' safety education, please notify the contents of the "Safety of Cutting Tool Products" to all workers.

2. Basic Characteristics of Hard Tool Materials

In Terms of "Safety of Cutting Tool Products"

Hard Tool Materials : General term for tool materials such as cemented carbide alloy, cermet, ceramics, sintered CBN, sintered diamond, high speed steel and alloy steel, etc.

Physical Characteristics

Appearance : Varies depending on the type of material. Eg. grey, black, gold, etc.

Smell : None

Hardness, Specific Gravity :

Hard Tool Materials	Hardness (HV)	Specific Gravity	Hard Tool Materials	Hardness (HV)	Specific Gravity
High Speed Steel (HSS)	200—1200kg/mm ²	7—9	Sintered CBN	2000—5000kg/mm ²	3—5
Cemented Carbide	500—3000kg/mm ²	9—16	Sintered Diamond	8000—12000kg/mm ²	3—5
Cermet	500—3000kg/mm ²	5—9	Alloy Steel	200—1200kg/mm ²	7—9
Ceramics	1000—4000kg/mm ²	2—7	Diamond Electroforming Product	8000—12000kg/mm ²	3—5

Constituents

Carbide, nitride, carbon nitride, oxide, W, Ti, Al, Si, Ta, B, V and metals such as Fe, Co, Ni, Cr, Mo.

3. Safety of Cutting Tool Products

- Hard tool materials have a large specific gravity. Thus, they require special attention as heavy materials when the size or quantity is large.
- Cutting tool products generate dust and mist during grinding operations or heating. This dust and mist can be harmful to the human body when coming in contact with the eyes or skin, or if substantial quantities are swallowed. When grinding and machining, it is recommended to use local exhaust ventilation and respirators, a dust protective mask, glasses, gloves and so on. If dust makes contact with the hands, thoroughly wash the affected area with soap and water. Don't eat in the exposed area, and wash hands thoroughly before eating. Remove dust from the clothing by a cleaner or washing, but don't shake off.
- Cobalt dust can affect the skin, respiratory organs and heart through repeated or prolonged contact.
- For further information, please refer to **MSDS** (Material Safety Data Sheet).

4. Handling Cutting Tool Products

- Surface conditions affect toughness of cutting tools. Therefore, use a diamond grinding wheel for finishing.
- Hard tool materials are extremely hard and brittle at the same time. Thus, they may be broken by shocks and tightening with excess force.
- Hard tool materials and ferrous materials have different thermal expansion ratios. Shrinkage or swell fit products may suffer from cracks when applied temperature is higher or lower than the appropriate temperature for the tool.
- Pay special attention on storing hard tool materials. Toughness of hard tool materials is lowered when they corrode due to coolant and other liquid.
- When brazing hard tool materials, if the temperature is too high or too low from the melting point of the brazing material, loosening and breakage may occur.
- After regrinding cutting tools, make sure that there are no cracks.
- Machining hard tool materials on EDM may cause cracks on the surface due to remaining electrons resulting in lowering the toughness. Eliminate cracks by grinding, etc.