



International Titanium Powder

Cristal US, Inc.



Powder Handling Guidelines for Working with Titanium Powder



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he purpose of this document is to provide safe-handling guidelines for titanium powder. Titanium powder in various forms is a flammable solid and will burn readily in air. Additionally, titanium airborne dust is extremely sensitive to ignition from an electrostatic source. Testing on ITP powders per ASTM E 2019 Standard Test Method for the Minimum Ignition Energy of a Dust Cloud showed that as little as 3 mJ is sufficient to ignite a dust cloud of titanium powder. This is equivalent to energy that can be generated from normal operator or warehouse personnel activity.

From the National Fire Protection Agency® (NFPA) 77 (2008 Edition) - 5.3.5 Static Discharge from the Human Body:

A person insulated from ground can accumulate a significant charge by walking on an insulated surface, by touching a charged object, by brushing surfaces while wearing nonconductive clothing, or by momentarily touching a grounded object in the presence of charge in the environment. During normal activity the potential on the human body can reach 10kV to 15kV, and the energy of a possible spark can reach 20 mJ to 30 mJ.



Grounding of personnel is recommended.

These guidelines are not inclusive of all necessary precautions for handling titanium powders, but are intended to promote awareness and the safe handling and processing of titanium powder.

STORAGE

- **Store in a closed container when possible to prevent accidental dust generation and to prevent possible contamination (because of dampness, dust, etc.).**
- **Protect containers from physical damage.**
- **Welding, grinding, or other processing that can generate heat and sparks should not be performed around any titanium powder. Smoking shall not be permitted in storage areas.**
- **Storage containers of Titanium powders must be kept separate from other chemicals in a storage area. Those chemicals may be, but are not limited to oxidizers, organics, fuels, etc...**
- **Recommend disabling automatic water-based sprinkler systems as water can contribute to material hazard in the event of a powder fire. Contact of burning titanium with water in a fire event will evolve flammable hydrogen gas, which may result in fire or detonation of hydrogen, and the potential to disturb more powder and spread the fire.**
- **NFPA 484 requires that in areas where titanium dust may be present, all electrical equipment must comply with Class 2, Division 1, Group E of the National Electrical Code.**
- **Review with local building authority for restrictions on building, storage piles, and total allowable quantities.**
- **Where powered fork-trucks and fork-lifts will be employed, reference NFPA 505 (2011).**



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HOUSEKEEPING

- Continuous housekeeping and cleaning must be maintained to minimize accumulation of titanium powder on floors and horizontal surfaces such as ducts, pipes, hoods, ledges, beams, suspended ceilings and other concealed surfaces within the facility. As a rule of thumb, accumulation of titanium powder should not exceed 1/32 inch thick on surfaces in the facility.
- Equipment must be maintained to minimize the escape of dust.
- Review NFPA 484 for general housekeeping practices for titanium powders.
- Vacuuming should never be performed; even with an explosion-proof vacuum cleaner, to pick up any waste or spilled powder. Fires or explosions while vacuuming may occur. A natural-fiber broom and non-sparking (i.e., aluminum) dust pan should be employed for removing powder. Shovel or sweep up placing material into a metal waste container with a sealing lid. Use non-sparking tools and equipment. Take precautionary measures against static buildup.
- Surfaces must be cleaned in a manner that minimizes the generation of dust clouds. Vigorous sweeping or use of compressed air must be avoided as they may produce hazardous dust clouds

EMERGENCY PRECAUTIONS

- Maintain a safe perimeter around equipment to insure adequate access to eliminate power to equipment in an emergency.
- Maintain a safe perimeter to insure adequate space to back away from equipment and/or powder in the event of a fire.
- Do not spray any titanium fires with water; contact with water in fire event will evolve flammable hydrogen gas - resulting in fire and/or explosion.
- Extinguishing agents should be applied in a manner that does not disturb or disperse accumulated dust to form a dust cloud. In the case a dust cloud is produced as a result of the fire fighting, a deflagration hazard will be present.
- All burnt materials and extinguishing media, once cooled should be shoveled into a metal drum and allowed to sit and complete cooling undisturbed. The lid should be locked into place and the drum disposed of following all federal and local guidelines.

HANDLING/USE

- **Recommended to electrically ground powder storage drum while using material.**
- **The following are some of the steps that can be taken to prevent static charge accumulation:**
 1. **conductive flooring and footwear**
 2. **personnel-grounding devices**
 3. **anti-static or conductive clothing**
- **Recommend process facility meet H2 occupancy rating as per the International Building Code, and electrical classification meet Class 2, Division 1, Group E of the National Electrical Code. Consult with local building codes.**
- **Suggested to use ground-connected metallic apparatus to prevent electrostatic charges from causing ignition. Anyone working with powder should ground themselves using devices such as wrist straps, and grounding plates (for work station & conductive shoes) prior to coming into contact with powder. Guidance for appropriate electrostatic protection (i.e. footwear) is available in NFPA 77 and in OSHA Directive Number CPL-03-00008.**
- **All equipment used to process titanium powder should be electrically bonded and grounded to prevent accumulation of static electricity.**
- **Recommended that grounding be confirmed by use of an electronic tell-tale system.**
- **Use proper personal protection equipment (PPE) guidelines when working with powder. Fire resistant clothing, full leather footwear, safety glasses and/or full face shield, and leather gloves are recommended.**
- **Use non-sparking, non-static inducing scoops and tools (such as aluminum or beryllium-copper).**
- **When powder is being processed, argon gas blanketing of processing equipment will reduce combustion risks, and minimize oxygen pick-up.**
- **When transferring powder into a container, recommend using a static-dissipative or conductive liner.**
- **Area should be well ventilated to guard against dust accumulation and from dust becoming airborne.**
- **While loading powder into any processing equipment, keep main supply of feed material at least four (4) feet from entrance or discharge of equipment.**
- **Hot zones of furnaces that handle titanium should be provided with inert atmospheres.**
- **Keep a well supplied stock of suitable extinguishing media nearby during processing. Suitable media include dry sand, talc, salt, and Class D extinguishing agents.**
- **Where Class A, B, C fire extinguishers are present in the areas where titanium is stored or processed, they must be marked "Not for use on Combustible Metal Fires."**
- **Where powered fork-trucks and fork-lifts will be employed, reference NFPA 505 (2011).**

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This document does not constitute a specification. Product Specifications are available on request.

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