



MATERIAL SAFETY DATA SHEET (MSDS)

MSDS No. : 1002

Issued Date: NOV.01, 2005

1. CHEMICAL, PRODUCT & COMPANY IDENTIFICATION

PRODUCT NAME : **Titacon CF910, CF920**
MANUFACTURER : TITAN PLASTICS COMPOUNDS CO., LTD
SECTION IN CHARGE : Quality Management
ADDRESS : No.120,Anbei Rd., Yanchao Township, Kaohsiung County, Taiwan, R.O.C
TELEPHONE NUMBER : 886-7-6167976
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2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPOSITION: Polyoxymethylene (Polyacetal)
POM $\geq 78\%$, Stabilizers etc. $\leq 2\%$, Carbon fiber 10~ 20%
STRUCTURAL Polyoxymethylene (Polyacetal)
FORMULA: $-(\text{C H}_2\text{O})_n-$
CAS No. : 24969-26-4 (base resin) .
INGREDIENTS Formaldehyde.
CONTRIBUTING TO
THE HAZARD :

3. HAZARDS IDENTIFICATION

MOST IMPORTANT HAZARDS: Incomplete combustion leads to generation of toxic gases such as carbon monoxide, in addition to carbonic acid gas and water.
Decomposition of polymer also leads to generation of formaldehyde.

HUMAN HEALTH EFFECTS: Not applicable.

ENVIRONMENTAL EFFECTS: Not applicable.

PHYSICAL AND CHEMICAL HAZARDS: It is inflammable substance and combustible if an igniting source is existent.
Neither dangerous reaction, fire nor explosion can be caused under normal conditions.

THE CLASSIFICATION: Not applicable.

4. FIRST-AID MEASURES

EYE CONTACT: Cool and rinse the eye with clean water for at least 15 minutes when the eyes had contact with molten polymer. In case of wearing contact lenses, remove the lenses as soon as possible, and ask a physician for advice. When the eye had contact with the polymer in an ordinary solid form, rinse the eye with clean water without delay. If the discomfort persists, ask a physician for advice.

SKIN CONTACT: Cool the contacted skin with clean water without delay, if a contact with the polymer in a molten form. Do not force to remove the solid resin on the skin. If any burns are observed on the skin, ask a physician for advice.

INHALATION: When a gas generated from the molten polymer has been inhaled, remove fresh air without delay and wait until the victim is recovered. If sick feeling continues, ask a physician for advice.

INGESTION :	Help to vomit as much as possible. If sick feeling continues, and ask a physician for advice.
MELT PROCESSING:	For molten plastic skin contact, cool affected area rapidly with water and immediately seek medical attention. WARNING: Do not attempt removal of plastic without medical assistance. Do not use solvent for removal If inhalation of processing fumes causes irritation, leave contaminated area and breathe fresh air. If coughing, difficult breathing or any other symptoms develop, seek medical attention at once, even if symptoms develop at a later time.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA :	Water, form fire-extinguishing agent, powder fire-extinguishing agent, and carbon dioxide gas.
SPECIFIC METHODS :	Extinguish the fire with water. A method of extinguishing an ordinary fire may be applied. Do not apply water directly to processing machines.
SPECIFIC HAZARDS :	Incomplete combustion leads to generation of toxic gases such as carbon monoxide or formaldehyde, in addition to carbonic acid gas and water.
SPECIAL EQUIPMENT FOR THE PROTECTION OF FIREFIGHTERS	In case the fire gained force, use a gas mask or other protective equipment.

6. ACCIDENTAL LEAKAGE MEASURES

PERSONAL PRECAUTIONS :	When pellets were spilled on the road or floor, wipe them off with a besom or cleaner not to cause slipping.
ENVIRONMENTAL PRECAUTION :	Handle the spillage in accordance with provisions given in the "Resin pellet spillage preventive manual", in order to prevent intakes by marine animals and birds.

7. HANDLING AND STORAGE

HANDLING 1:	Polyacetal resin in a pellet form will neither ignite nor explode at room temperatures, but it falls under the inflammables designated by the Fire Service Law. Keep it away from the igniting sources, as it quickly gains force once it is ignited.
HANDLING 2:	Polyacetal resin in a powdered form is likely to cause dust explosion and is therefore designated in the Guideline for Hazard of Dust Explosion in U.S. Bureau of Mines. Effective earthing means or use of inert gas like N ₂ are required for dust handling equipment to eliminate static electricity.
HANDLING 3:	Polyacetal pellets spilled on the floor are likely to cause slipping. Remove such spillage at any times.
HANDLING 4:	For molding work, effective means for local exhaust are required to discharge gases generated by melt processing.
HANDLING 5:	Avoid inhaling of gases generated in molding work. Do not directly touch resin of high temperature.
HANDLING 6	Avoid retaining hot resin in the processing machines for many hours.
HANDLING 7:	Avoid mixed extrusion with strong acid, oxidizing agents and PVC.

HANDLING 8:	<p>Carbon fibers are not generally exposed in a single substance under normal processing and handling conditions as they are compounded in pellets. However, the following measures will be necessary to minimize the exposure to carbon fibers or dusts containing carbon fibers, when pellets or molded parts containing carbon fibers are cut, ground or burnt, depending on environmental and operational conditions.</p> <p>Those who are sensitive in skin to carbon fiber should wear suitable (protective) clothes to minimize the exposure of their skin.</p> <p>Wash working clothes apart from other laundry, so that the latter will not cause contamination with carbon fibers.</p> <p>Provide the workshop with partitions to prevent diffusion of carbon fiber dusts.</p> <p>Pay precautions not to rub face, neck or arms with hands. Wash hands and gargle after working without fail.</p> <p>Keep dust sources totally enclosed.</p> <p>Installation of a carbon fibers recovery filter at the exhaust port is necessary for keeping carbon fibers from flowing outside, in addition to installation of local air exhausters. Periodical adjustments and inspections are also required at least once or more every year.</p> <p>Reduce cutting and grinding processes to the possible minimum, and devise working procedures to minimize dust generation.</p> <p>Provide dust-preventive masks, protective glasses and gloves for personal hygiene.</p> <p>Determine the operational environment at indoor working places and confirm the effects of environmental improvement.</p> <p>There is a risk of short circuit or other troubles in electric systems caused by carbon fibers floating in the atmosphere as they are electrically conductive. Therefore, dust preventive measures are required for sections where carbon fibers are likely to be produced.</p> <p>Disposal of carbon fiber wastes are subject to the laws concerning industrial wastes handling. Reclaiming into the soil is recommended for proper disposal. Avoid to burn in incinerators, as it results in diffusion of carbon fiber dusts produced during the process into the atmosphere and a subsequent risk of electrical troubles.</p> <p>Note) Carbon fibers are, like road dusts, told to be least hazardous to human bodies, but proper measures are required to avoid useless inhaling.</p>
HANDLING 9:	<p>Pellets and molded parts using carbon fiber as filler are electrically conductive in general, and therefore avoid use in places where insulation is required in general.</p>
STORAGE 1:	<p>Keep the substance away from any fire or heat sources for the sake of safe storage.</p>
STORAGE 2:	<p>This polymer is a synthetic resin designated as an inflammable substance by the Fire Service Law and should be handled in accordance with municipal rules and regulations (concerning firefighting equipment, indoor storage, for instance).</p>
RECOMMENDED PACKAGING MATERIALS:	<p>No information.</p>

8. EXPOSURE CONTROL / PERSONAL PROTECTION

CONTROL CONCENTRATION	None at present.
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PERMISSIBLE CONCENTRATION:	OSHA PEL/1985 Max. permissible concentration of inactive powder 15mg/m ³ - ditto - (Aspiration) 5mg/ m ³ ACGIH TLV/1992 1993 Exposure limit of the powder TWA 10 mg/ m ³ (Reference) Human exposure to formaldehyde - Ministry of Health & Welfare/2002 Guideline value 0.08 ppm OSHA Parameter/1992 TWA 0.75 ppm STEL 2 ppm ACGIH TLV/1992 1993 TWA 0.3 ppm
ENGINEERING MEASURE:	When handling dust: Use totally enclosed containers resisting dust explosion. When heat melted in molding: Effective local ventilation must be provided.
RESPIRATORY PROTECTION:	Wear a dust-proof mask.
EYE PROTECTION:	Wear protective glasses or goggles.
HAND PROTECTION:	Wear heat-resisting gloves against burns, when handling molten polymer.
SKIN & BODY PROTECTION:	Wear long sleeve clothes against burns, when handling molten polymer.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE :	Pellet.
BOILING POINT:	Not applicable.
VAPOUR PRESSURE :	Not applicable.
VOLATILITY:	Not applicable.
SUBLIMATION :	None
MELTING POINT :	165 °C (329 deg. F) .
DENSITY:	1.47
SOLUBILITY:	Insoluble in water.
FLASH POINT:	320°C or higher.
IGNITION POINT:	400°C or higher.
EXPLOSION PROPERTY:	Not applicable.
INFLAMMABILITY:	Inflammable (Designated as inflammable resin by the Fire Service Law).
REACTIVITY WITH WATER:	None.
OXIDIZABILITY:	None.
SELF-REACTIVITY:	None.
DUST EXPLOSIVENESS	Upper explosion limit : Not applicable. Lower explosion limit : 35g/ m ³ .

10. STABILITY AND REACTIVITY

STABILITY AND REACTIVITY	Stable for normal storage or handling.
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CONDITIONS TO AVOID: Avoid contacts with strong acid, oxidizing agent or PVC under hot melt conditions.

HAZARDOUS DECOMPOSITION PRODUCTS : Formaldehyde will be generated when heated (for drying or melting) or burnt.

11. TOXICOLOGICAL INFORMATION

SKIN CORROSIVE PROPERTIES : No finding

SENSITIZING & IRRITANT EFFECTS: Gas generated in drying or melting is irritating eyes and skins.

ACUTE TOXICITY (INCLUDING LD₅₀) : No finding

SUBACUTE TOXICITY : No finding

CHRONIC TOXICITY : No finding

CARCINOGENECITY : No finding

MUTAGENECITY (Micro organisms, chromosomal aberration): No finding

REPRODUCTIVE TOXICITY : No finding

TERATOGENICITY : No finding

OTHERS (Including generation of hazardous gases by reaction with water, for example) : No finding in this report means that there will be no hazard in general, but no proving data available at the time of reporting.

OTHER CAUTIONS 1: With regard to dust, the maximum permissible concentration and limits are fixed by OSHA and ACGIH.

OTHER CAUTIONS 2: Formaldehyde will be generated when heated (for drying or melting) or burnt.

OTHER CAUTIONS 3: Hazardousness of carbon fiber as the filler

There is no report of actual cases giving hazards to human body which is supposedly attributed to carbon fibers. Public organizations such as IPCS, LARC, WHO and ILO also admit that there is no evidence to prove hazardous properties of carbon fibers. Therefore, they are not taking up carbon fibers in rating of various substances in carcinogenicity.

There are 2 cases of investigation on carbon fibers manufacturing sites made abroad. The one is a survey in England which has not included a case report. The other one is a survey in Soviet Union which had a report of bronchitis and recommended a permissible concentration of carbon fiber dust as 4 mg/m³.

A few animal tests and in-vitro tests were carried out. Most of these tests have recognized no influence on living things except a few. And yet, we cannot discuss about hazardousness of carbon fibers from these test results, as most of them have not shown details of the testing conditions applied. Even some reports which have quoted affirmative influences pointed out that such effects were weaker compared with those of chrysotile asbestos which were tested simultaneously.

Carbon is generally told to be biologically adaptable, and carbon fiber and its compounds are so. They are applied to artificial ligaments, dental roots and cardiac valves with successful results.

Situations being as above-mentioned, there is no necessity for having an excessive fear of the safety of carbon fibers to the human body.

Since carcinogenicity of fine fibrous substances is not yet clarified, we must keep our eyes open on information about asbestos, eolith and other artificial mineral fibers, understand the situations and further continue investigations, if necessary. As the dust containing carbon fibers is as unpleasant as other dusts and causes stimulation to some people, attention must be called for to the handling of carbon fiber.

WHO: World health Organization

IPCS: International Programmed on Chemical Safety

IARC: International Agency Research on Cancer

ILO : International Labor Organization

OTHER CAUTIONS 4: Carcinogenicity class of formaldehyde, which may be generated if overheated. IARC(International Agency for Research on Cancer):Group1

12. ECOLOGICAL INFORMATION

BIODEGRADABILITY: No finding.

BIOACCUMULATION : No finding.

FISH TOXICITY: No finding.

13. DISPOSAL CONSIDERATION

WASTE FROM RESIDUES 1 : This is designated as waste plastics among industrial wastes by the Wastes Disposal Law. Disposal waste through licensed wastes handlers or local autonomous bodies if they are handling wastes disposal.

WASTE FROM RESIDUES 2 : When disposed by incineration, use the well controlled incinerators in accordance with the Wastes Disposal Law, Air Pollution Control Law and Water Pollution Prevention Law.

14. TRANSPORT CONSIDERATION

UN CLASSIFICATION NUMBER: Not applicable.

OTHER CAUSIONS 1: Handle with care so as not to give damages to containers or not to be subjected to wetting.

OTHER CAUSIONS 2: Secure the containers firmly so as not to cause collapsing.

15. REGULATORY INFORMATION

FIRE SERVICE LAW: Inflammable synthetic resin.
Designated quantity: More than 20 m³ for the foamed product.
More than 3,000 kg for other types.

WASTE DISPOSAL LAW: Waste plastics among industrial wastes.

OTHERS : Formaldehyde is designated as Class 3 substance by the Industrial Safety and Health Law (Regulations concerning hazards caused by specific chemicals) and designated as deleterious substance by the Poisons and Deleterious Substance Control Law. Recommended usage, criteria, and limit values are provided by Japan Industrial Safety and Health Society, OSHA and ACGIH.

16. OTHER INFORMATION

HANDLING OF THE DETAILS GIVEN ABOVE: Details given above are based on references, information and data available at this moment, but no warranty can be made on exactness of these details. They are also prepared on the assumption that the product will be handled in a normal way. For special handling, adequate safety and environmental measures should be taken in respect to its applications. Our products are not specifically intended for implants for medical and dental applications, and therefore they are not recommended for such applications. "No finding" in this report means that there will be no hazard in general, but no proving data is available at the time of reporting.

WHERE TO CALL FOR FURTHER INFORMATION : 07-6167976