



Safety Data Sheet

1. IDENTIFICATION

Product Name: Rechargeable lithium-ion single cells, modules and multi-cell battery packs Synonyms: Sealed Lithium Ion Battery	Product Use: Vehicle Electrical System Manufacturer/Supplier: Johnson Controls Battery Group Address: P.O. Box 590 Milwaukee, WI 53201 US
General Information Number: (800)-333-2222 ext. 3138 Contact Person: Industrial Hygiene & Safety Department	Emergency number: CHEMTREC: 800-424-9300

NOTE: The Johnson Controls sealed cell/battery is considered an article as defined by 29 CFR 1910.1200 (OSHA Hazard Communication Standard). The information contained in this SDS is supplied at the customer's request for information only.

CAUTION

Lithium Ion Cells/Batteries are electrochemical storage devices. Subjecting them to mishandling or abuse conditions can result in fires, severe personal injury and death.

Do not charge, short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product – possible risk of fire or rapid component disassembly. The rechargeable lithium-ion

batteries described in this Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.

Under normal conditions of use, the electrode materials and liquid electrolyte they contain are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, contamination of electrode materials, mixture with moisture/water or battery vent/fire/rapid component disassembly may follow, depending upon the circumstances.

2. HAZARD(S) IDENTIFICATION


Acute Effects **EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.**

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.

Chronic Effects **EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.**

In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.

Label Elements:
Organic Electrolyte
Lithium Hexafluorophosphate

Health and Physical	
	
Hazard Statements Warning! Flammable Harmful if swallowed Harmful in contact with skin Causes severe burns Causes serious eye damage The chemical risk is the caustic nature of the electrolyte	Precautionary Statements Keep out of reach of children Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking Wear protective gloves/protective clothing/eye protection/face protection Take off immediately all contaminated clothing. If skin or eye irritation occurs: Get medical advice/attention

3. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENTS (Chemical/Common Names):	CAS No.:	% by Wt:
Mixed Metal (May include nickel, iron, cobalt, phosphorus, lithium, manganese, and/or aluminum oxide compounds)	Mixture	10-25
Carbon Solids	7782-42-5 1333-86-4	10-25
Mixed Organic Carbonate Electrolyte	Mixture	10-60
Methyl Butyrate	623-42-7	0-5
Lithium Hexafluorophosphate	21324-40-3	2-25
Aluminum Metal	7429-90-5	10-25
Copper Metal	7440-50-8	1-15

4. FIRST AID MEASURES

Inhalation	EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE. However, if organic electrolyte is released due to overcharging or abuse of the battery, remove exposed person to fresh air. If breathing is difficult, oxygen may be administered. In severe cases obtain medical attention immediately.
Skin contact	EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE. However, if organic electrolyte contacts skin, wash off skin thoroughly with water. Remove contaminated clothing and wash before reuse. If irritation develops or in severe cases obtain medical attention immediately. Seek medical attention as soon as possible for all burns regardless of how minor they may appear initially
Eye contact	EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE. However, if organic electrolyte enters eyes, thoroughly flush eyes with water for a minimum of 15 minutes. Obtain medical attention immediately.
Ingestion	EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE. However, if internal components are ingested, rinse out mouth thoroughly with water and give plenty of water to drink. Do not induce vomiting. Obtain medical attention immediately.

5. FIRE FIGHTING MEASURES

Flash Point	Not applicable unless individual components exposed.
Auto ignition	No data available.
Temperature	
Flammable Limits in Air, % by volume	Not applicable unless individual components exposed.
Extinguishing Media	Dry chemical, foam, or CO ₂ extinguishers. CO ₂ extinguishers, generous amounts of water spray, copious quantities of water or water-based foam can be used to cool down burning Li-ion cells and batteries.
Special Fire Fighting Procedures	Use positive pressure, self-contained breathing apparatus. Wear protective clothing to prevent potential body contact with the electrolyte solution or its by-products.
Unusual Fire and Explosion Hazard	The sealed battery is not considered flammable, but it will vent and burn if involved in a fire. The organic electrolyte reacts with moisture/water to produce hydrogen fluoride (HF). Decomposition products may include metal oxides/oxides.

6: ACCIDENTAL RELEASE MEASURES

Protective Measures to be Taken if Material is Released or Spilled	Remove personnel from area until fumes dissipate. Use recommended personal protective equipment. Cover battery or spilled substances with an absorbing material, place in approved sealed container and dispose in accordance with applicable local, state and federal regulations.
Waste Disposal Method	Dispose of in accordance with applicable local, state and federal regulations.

7. HANDLING AND STORAGE

Handling	Do not crush, pierce, short circuit (+) and (-) battery terminals with conductive (i.e. metal) goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands. Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays. Cells or batteries that have been dropped or experienced mechanical shock should be isolated and monitored for approximately 5 days to identify a possible internal short circuit and resulting fire.
Storage	Store in a cool (preferably below 30°C) and ventilated area, away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 70°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not expose them to unnecessary or excessive handling. Recommended storage range: -30 to +40 Deg C. Cells may experience short temperatures from + 41 to 60 Deg C for total accumulated excursion not exceeding 7 Days. Never store cells above 60 Deg C.
Other	Follow Manufacturers Recommendations regarding maximum recommended currents and operating temperature range. Do not overcharge beyond the recommended upper charging voltage limit. Applying pressure or deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure limits

US OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Ingredient	CAS Number	Type	Value	Form
Mixed Metal (<i>May include nickel, iron, cobalt, phosphorus, lithium, manganese, and/or aluminum oxide compounds</i>)	Mixture	TWA	Co – 0.1 mg/m ³ Ni – 1.0 mg/m ³ Mn – 5.0 mg/m ³ Al – 5.0 mg/m ³	Dust
Carbon Solids	1333-86-4 7782-42-5	TWA	3.5 mg/m ³ 15 C/m ³	Dust Total Graphite

			5 Cg/m ³	Respirable Dust
Lithium Hexafluorophosphate	21324-40-3		2.5 mg/m ³	Dust
Copper Metal	7440-50-8	PEL	1 mg/m ³	Dust and Mist
Aluminum	7429-90-5	PEL	15 mg/m ³ 5 mg/m ³	Respirable dust Total Dust

US OSHA Table Z-3 (29 CFR 1910.1000)

Ingredient	CAS Number	Type	Value
Carbon Solids	1333-86-4 7782-42-5	TWA	mppcf

US ACGIH Threshold Limit Values

Ingredient	CAS Number	Type	Value	Form
Mixed Metal (<i>May include nickel, iron, cobalt, phosphorus, lithium, manganese, and/or aluminum oxide compounds</i>)	Mixture	TWA	Co – 0.05 mg/m ³ Ni – 0.05mg/m ³ Mn – 0.2 mg/m ³ Al – 1.0 mg/m ³	Dust
Carbon Solids	1333-86-4 7782-42-5	TWA	3.5 mg/m ³ 2 C/m ³	Dust Graphite
Copper Metal	7440-50-8	TWA	1 mg/m ³ 0.2 mg/m ³	Dust and Mist Fume
Aluminum Metal	7429-90-5	TWA	1 mg/m ³	Respirable fraction

US NIOSH: Pocket Guide to Chemical Hazards

Ingredient	CAS Number	Type	Value	Form
Copper Metal	7440-50-8	TWA	1 mg/m ³	Dust and Mist
Aluminum Metal	7429-90-5	TWA	5 mg/m ³ 5 mg/m ³ 10 mg/m ³	Welding fume or pyrophoric powder Respirable Total
Carbon Solids	1333-86-4 7782-42-5	TWA	2.5 mg/m ³	Respirable

Respiratory Protection (NIOSH/MSHA approved):

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary to handle damaged product where exposure to the organic electrolyte is a possibility, respiratory protection may be required.

Section 8: Exposure Controls/Personal Protection

Skin Protection:

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary to handle damaged product where exposure to the organic electrolyte is a possibility, PVC gauntlet-type gloves with rough finish are recommended along with a chemically resistant apron.

Eye Protection:

NONE REQUIRED FOR NORMAL HANDLING OF THE FINISHED PRODUCT.

If necessary to handle damage product where exposure to the organic electrolyte is a possibility, chemical splash goggles and a face shield are recommended.

Other Protection:

Safety footwear meeting the ANSI Z 41.1 requirements is recommended when it is necessary to handle the finished product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor	Solid metal cylinder, rectangular pouch or solid container, containing mixed metal oxides, carbon solids and organic electrolyte. Metallic odor.
Odor Threshold	Not applicable.
pH	Not applicable
Boiling Point	Not applicable unless individual components exposed.
Melting Point	Aluminum container – 1220 degrees F (660 degrees C) Steel pack container – 2552 to 2804 degrees F (1400 to 1540 degrees C)
Specific Gravity (H₂O = 1)	Not applicable unless individual components exposed.
Flash Point	Not applicable
Evaporation Rate (Butyl Acetate = 1)	Not applicable unless individual components exposed.
Vapor Pressure (mm Hg @ 20 deg C)	Not applicable unless individual components exposed.
Flammability	Not applicable
Upper/lower flammability or explosive limits	Not applicable.
Vapor Pressure	Not applicable.
Vapor Density (Air = 1)	Not applicable unless individual components exposed.
Relative Density	Not applicable.
Solubility	Not applicable unless individual components exposed.
% Volatile by Weight	Not applicable unless individual components exposed.
Partition coefficient (n-octanol/water)	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Not applicable
Viscosity	Not applicable

10. STABILITY AND REACTIVITY

Stability	The sealed battery is considered stable.
Conditions to Avoid	Sparks and other sources of ignition; high temperature; over charging.
Incompatibility (materials to avoid)	Organic electrolyte – reacts with water to produce hydrogen fluoride.
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, phosphorous oxides. <i>Mixed metal oxide</i> – nickel, cobalt, and manganese oxides can be released. <i>Organic electrolyte</i> – reacts with water to produce hydrogen fluoride (HF).
Hazardous Polymerization	Will not occur.

11. TOXICOLOGICAL INFORMATION

NOTE: Under normal conditions of use, this product does not present a health hazard. The following information is provided for organic electrolyte and the mixed metal oxide exposure that may occur due to container breakage or under extreme conditions such as fire.

Organic electrolyte – reacts with moisture/water to produce hydrofluoric acid in trace quantities. Hydrofluoric acid is extremely corrosive and toxic. In severe exposures it acts as a systemic poison and causes severe burns. The reaction may be delayed. Any contact with this material, even minor, requires immediate medical attention.

ROUTES AND METHODS OF ENTRY

Inhalation	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be severely corrosive to the respiratory tract and may cause sore throat, coughing, labored breathing and lung congestion/inflammation. Overcharging or seepage of electrolyte from broken batteries may present inhalation exposure in a confined area.</p>
Skin Contact	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the skin. Skin contact can cause serious skin burns which may not be immediately apparent or painful. Symptoms may be delayed 8 hours or longer. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and even bone.</p>
Skin Absorption	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be absorbed through the skin.</p>
Eye Contact	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive to the eyes and can cause severe irritation, burns, and cornea damage. Symptoms of redness, pain, blurred vision, and permanent eye damage may occur.</p>
Ingestion	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Extreme exposures to the organic electrolyte can be corrosive and may cause sore throat, abdominal pain, diarrhea, vomiting, severe burns of the digestive tract, and kidney dysfunction. Hands contaminated by contact with internal components of a battery can also cause ingestion of mixed metal oxides and carbon solids. Hands should be washed thoroughly prior to eating, drinking, or smoking.</p>

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Acute Effects	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Exposure and/or contact with organic electrolyte solution/mist may lead to acute irritation of the skin, corneal damage of the eyes and irritation of the mucous membranes of the eyes and upper respiratory system, including lungs.</p>
Chronic Effects	<p>EXPOSURE IS NOT EXPECTED FOR PRODUCT UNDER NORMAL CONDITIONS OF USE.</p> <p>In the event of overcharging or damage to the unit, exposure to organic electrolyte solution/mist is possible. Contact with the organic electrolyte may lead to skin burns/ulceration, scarring of the cornea, and chronic respiratory conditions. Extreme exposures – intake of more than 6 mg of fluorine per day may result in fluorosis, bone and joint damage. Hypocalcemia and hypomagnesemia can occur from absorption of fluoride ion into blood stream.</p>

POTENTIAL TO CAUSE CANCER

Nickel has been identified by the National Toxicology Program (NTP) as reasonably anticipated to be a carcinogen. Cobalt and cobalt compounds have been identified by the International Agency for Research on Cancer (IARC) as possible carcinogenic to humans (Group 2B). Carbon black has been identified by the International Agency for Research on Cancer (IARC) as possible carcinogenic to humans (Group 2B).

California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute – Cobalt Oxide, Nickel Oxide, Carbon Black and Lithium Nickelate

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Contact with or exposure to the organic electrolyte may aggravate skin diseases such as eczema and contact dermatitis, respiratory disorders such as lung injuries and asthma, and kidney function.

Toxicological Data

Constituents	Species	Test Results
Copper (CAS 7440-50-8)		
Acute		
<i>Dermal</i>		
LD50	Rat	> 2000 mg/kg, 24 hours
<i>Inhalation</i>		
LC50	Rat	> 2.77 mg/l, 4 hours
<i>Oral</i>		
LD50	Rat	481 mg/kg
Aluminum (CAS 7429-90-5)		
Acute		
<i>Inhalation</i>		
LC50	Rat	> 0.888 mg/l, 4 hours
Carbon Solids (CAS 7782-42-5)		
Acute		
<i>Inhalation</i>		
LC50	Rat	> 2000 mg/m3, 4 hours
<i>Oral</i>		
LD50	Rat	> 1000 mg/kg
Lithium hexafluorophosphate (CAS 21324-40-3)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	275 mg/kg
<i>Oral</i>		
LD50	Rat	1702 mg/kg

12. ECOLOGICAL INFORMATION

Mammalian effects	None known if used/disposed of correctly.
Eco-toxicity	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.
Mobility in Soil	None known if used/disposed of correctly.

13. DISPOSAL CONSIDERATIONS (UNITED STATES)

Waste disposal method	Recycle and dispose of in accordance with applicable local, state and federal regulations. Landfill of spent Li-Ion Batteries is not recommended
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

Cells and batteries are classified UN3480 PGII Lithium Ion Cells, Class 9 Hazardous Material (Dangerous Goods) for all transportation modes. Cells have been tested to UN Manual of Test Criteria Part III Section 38.3. Consult Johnson Controls for Declaration of Conformity for Cells and specific battery designs, as needed.

Li-Ion materials must conform to 49 CFR173.185 in the United States. Shipping via Cargo Air freight and exceeding 35kg is subject to shipping under a specific transportation authorization. Shipping via Passenger aircraft is prohibited.

Note: Transportation requirements do not apply once the battery pack has been installed in a vehicle as part of the vehicle's functional components.

Information & Labels for conveyance	For the single cell batteries and multi-cell battery packs that are non-restricted to transport, use lithium-ion batteries inside label. For the single cell batteries and multi-cell battery packs which are restricted to transport (assigned to the Miscellaneous Class 9), use Class 9 Miscellaneous Dangerous Goods and UN Identification Number labels. Packages must be marked "Cargo Aircraft Only". Only trained, personnel certified in packing, shipping and documenting Dangerous Goods may offer this material for transport. NOTE: Cells that are non-intact, breeched, vented or physically damaged may not be shipped. In all cases, refer to the product transport certificate issued by the Manufacturer.
UN number	UN 3480 PG II (all modes)
Shipping name	Lithium Ion Batteries
Hazard classification	Depending on their equivalent lithium compound content, some single cells and small multicell battery packs may be non- assigned to Class 9 (refer to Transport Certificate).
Packing group	II
IMDG Code	9033
CAS	Not applicable
EmS No.	4.1-06
Marine pollutant	No
ADR Class	Class 9
State of Charge	It is recommended that cell be shipped with a State of Charge (SOC) that does not exceed 50%. Minimum recommended shipping SOC is 20%.

15. REGULATORY INFORMATION

This product is an article pursuant to 29 CFR 1910.1200 and as such is not subjected to the OSHA Hazard Communication Standard.

All components are on the U.S. EPA TSCA Inventory list.

TSCA Status: All ingredients contained in this products. Nickel used in this products has been identified by the National Toxicology Program as reasonably anticipated to be a carcinogen, Cobalt and nickel compounds have been identified by the International Agency for Research on Cancer (IARC) as a possible carcinogenic to humans (Group 2B). Carbon black has been identified by the International Agency for Research on Cancer (IARC) as a possible carcinogenic to humans (Group 2B).

California Proposition 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require warning under the statute – Cobalt Oxide, Nickel Oxide, Carbon Black, Lithium Nickelate.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not Regulated

OSHA Specifically Regulated Substances (29 CFR 1910.0002-1050)

Not Regulated

CERCLA Hazardous Substance List (40 CFR 302.4)

Cooper (CAS 7440-50-8)	LISTED
Methyl Butyrate (CAS 623-42-7)	LISTED

Superfund Amendments and Reauthorization Act of 1986

Hazardous categories	Immediate Hazard – No
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Delayed Hazard – No
Fire Hazard – No
Pressure Hazard – No
Reactivity Hazard – No

SARA 302 Extremely hazardous substance

Not listed

SARA 311/312 Hazardous Chemical

No

SARA 313 (TRI Reporting)

Chemical Name	CAS Number	% by weight
Aluminum	7429-90-5	10-25
Copper	7440-50-8	1-15

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated

Safe Drinking Water Act (SDWA)

Not regulated

US State Regulations

US. Massachusetts RTK – Substance List

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US New Jersey Worker and Community Right-to-know Act

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US Pennsylvania Worker and Community Right-to-know Law

Aluminum (CAS 7429-90-5)
Carbon Solids (CAS 7782-42-5)
Copper (CAS 7440-50-8)
Methyl Butyrate (CAS 623-42-7)

US Rhode Island RTK

Aluminum (CAS 7429-90-5)
Copper (CAS 7440-50-8)

International Inventories

Country(s) or Region	Inventory Name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

* A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. OTHER INFORMATION

Issue Date: 04/01/2015

Revision Date: 12/07/2015

Version #: 02

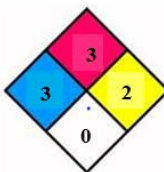
Further information: NFPA Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3=Serious 4 = Severe

NFPA ratings



HMIS rating:

Organic Electrolyte



EC Classification

None

WHMIS Classification

Manufactured article not controlled under WHMIS

Transportation

See Section 14

List of abbreviations

LD50: Lethal Dose. 50%

TWA: Time weighted average

Disclaimer

This information is provided without warranty. The information is believed to be correct. This information should be used to make independent determination of the methods to safeguard workers and the environment.