Prepared to OSHA, ACC, ANSI, NOHSC, WHMIS & 2001/58 EC Standards | MSDS Revision: 13 | MSDS Revision Date: 01/02/2019

1. PRODUCT

1.1	Product Name: **LITHIUM ION BATTERY**
1.2	Chemical Name: **LITHIUM ION BATTERY**
1.3	Synonyms: **LITHIUM ION BATTERY**
1.4	Trade Names: Part No's: 24409, 28502, 29594, BT17790-2, BT17790-2B, BT17790-3, CT17102-2, CT17102-5, CT17497-1, CT18499-1, CT18499-1B, P1026078, P1031365-059, P1040687, P1051378, P1051378-002, P1051378-003, P1051378-004, P1058672, P1071565, P1071566, P1073291, P1075298, P1077747, P1077752 P1075278, P1083277-001, P1083277-002, P1089503-004, P1089760-002, P1098850-001, P1089503-002, P1089503-003, P1091701, P1098850-002 P1098968, P1099009
1.5	Product Use: **POWER SUPPLY**
1.6	Manufacturer s Name: **ZEBRA TECHNOLOGIES CORPORATION**
1.7	Manufacturer s Address: **3 OVERLOOK POINT, LINCOLNSHIRE, IL, 60069 USA**
1.8	Emergency Phone: **CHEMTREC**
1.9	Business Phone: **1-800-424-9300 (NORTH AMERICA) / 1-703-527-3887 (INTERNATIONAL)**

2. HAZARD

2.1	Hazard Identification: **This product is classified as a hazardous substance and as dangerous goods according to the classification criteria of NOHSC and ADG Code (Australia). These products are solid articles consisting of sealed cylindrical and coin batteries. The following information is for the chemicals contained inside the batteries. As manufactured, exposure to individual components is not expected. If these products are cut or otherwise manipulated in such a way that will release the chemicals contained inside, exposure to these components is possible. If involved in a fire, the chemicals contained in the battery may decompose and produce toxic gases (e.g. carbon, phosphorous, sulfur, and metal oxides and metal compounds). During a fire involving this product care should be taken to avoid inhalation of fumes. Water applied to ruptured batteries involved in fire may generate flammable hydrogen gas.**						
2.2	Routes of Entry:	Inhalation:	**NO**	Absorption:	**NO**	Ingestion:	**YES**
2.3	Effects of Exposure: **INGESTION: Ingestion is unlikely, however, if electrolyte is swallowed, may cause nausea, vomiting and or diarrhea and localized burns. EYES: Exposure to the electrolyte contained inside the battery may result in severe irritation and chemical burns. Symptoms of overexposure may include redness, itching, irritation and watering. SKIN: Exposure to the electrolyte contained inside the battery may result in chemical burns. Exposure to lithium may cause dermatitis in some sensitive individuals. Misuse of these products, such as deliberate destruction, may release diethyl carbonate, ethylene carbonate, and organic solvents contained within the batteries. Diethyl carbonate, ethylene carbonate, and organic solvents may cause irritation. INHALATION: During normal use inhalation is an unlikely route of exposure due to containment of hazardous materials within the battery case. However, should the batteries be exposed to extreme heat or pressures causing a breach in the battery cell case, exposure to the constituents may occur. Misuse of these products, such as deliberate destruction may release diethyl carbonate, ethylene carbonate, and organic solvents contained within the batteries, which may cause irritation and central nervous system effects. Central nervous system effects can include headache, dizziness, nausea, weakness, and loss of consciousness.**						
2.4	Symptoms of Overexposure: **EYES: Exposure of electrolyte or lithium metal to eyes may cause severe eye irritation, possible corneal burns or eye damage. SKIN: Symptoms of skin overexposure may include redness, itching, and irritation of affected areas. The product can cause allergic skin reactions (e.g., rashes, welts, dermatitis) upon prolonged or repeated exposure.**						
2.5	Acute Health Effects: **EYES: Severe irritation to eyes near affected areas. SKIN: Mild to moderate irritation to skin near affected areas. INHALATION: Inhalation of lithium compounds or metals may result in irritation to the nose, throat and lungs.**						
2.6	Chronic Health Effects: **None reported by the manufacturer. Dermal contact with lithium metal or its salts (e.g., from deliberate destruction) may result in dermatitis in sensitive individuals.**						
2.7	Target Organs: **Eyes, skin & respiratory system.**						

NA = Not Available; ND = Not Determined; NE = Not Established; C = Ceiling Limit; See Section 16 for Additional Definitions of Terms

NOTE: all WHMIS required information is included. It is in appropriate sections based on ANSI Z400.1 requirement.

3. COMPOSITION & INGREDIENT INFORMATION

CHEMICAL NAME(S)	CAS No.	RTECS No.	EINECS No.	%	EXPOSURE LIMITS IN AIR (mg/m3)					
					ACGIH - ppm		OSHA - ppm			OTHER
					TLV	STEL	PEL	STEL	IDLH	TWA STEL (NOHSC)
TYPE 1 CYLINDRICAL BATTERY										
GRAPHITE	7782-42-5	MD9659600	231-955-3	NA	(2)	NA	(2)	NA	NA	RESP FRACT
LITHIUM COBALT OXIDE	12190-79-3	NA	235-362-0	NA	(0.0)	NA	(0.0)	NA	NA	AS COBALT
LITHIUM SALT	NA	NA	NA	NA	NE	NE	NE	NE	NE	
ORGANIC SOLVENT	NA	NA	NA	NA	NE	NE	NE	NE	NE	
POLYVINYLIDENE DIFLUORIDE	24937-79-9	NA	NA	NA	NE	NE	NE	NE	NE	
TYPE 2 CYLINDRICAL BATTERY										
DIETHYL CARBONATE	105-58-8	FF9800000	203-311-1	NA	NE	NE	NE	NE	NE	
ETHYLENE CARBONATE	96-49-1	FF9550000	202-510-0	NA	NE	NE	NE	NE	NE	
GRAPHITE	7782-42-5	MD9659600	231-955-3	NA	NE	NE	NE	NE	NE	
LITHIUM COBALT OXIDE	12190-79-3	NA	235-362-0	NA	(0.0)	NA	(0.0)	NA	NA	
LITHIUM HEXAFLUROPHOSPHATE	21324-40-3	NA	244-344-7	NA	NE	NE	NE	NE	NE	

4. FIRST AID

4.1 First Aid:

INGESTION: **DO NOT INDUCE VOMITING. Contact PERS at +1 (800) 633-8253 or the nearest Poison Control Center or local emergency telephone number for assistance and instructions. Seek immediate medical attention. If vomiting occurs spontaneously, keep victim's head lowered (forward) to reduce the risk of aspiration.**

EYES: **If product gets in the eyes, immediately flush with copious amounts of lukewarm water for at least 15 minutes. Open and close eyelid(s) to ensure thorough irrigation. Seek immediate medical attention.**

SKIN: **If irritation occurs & product is on the skin, rinse thoroughly with lukewarm water, followed by a thorough washing of the affected area with plenty of soap and water. Remove all contaminated clothing, including footwear and wash thoroughly before reuse. If irritation, redness or swelling persists, seek medical attention.**

INHALATION: **Remove victim to fresh air at once. Under extreme conditions, if breathing stops, perform artificial respiration. Seek immediate medical attention.**

4.2 Medical Conditions Aggravated by Eexposure:

Pre-existing dermatitis, other skin conditions, and disorders of the target organs (eyes, skin, respiratory system).

5. FIREFIGHTING

5.1 Flashpoint & Method: **Not Applicable**

5.2 Autoignition Temperature: **Not Applicable**

5.3 Flammability Limits: Lower Eexplosive Limit (LEL): **NA** Upper Explosive Limit (UEL): **NA**

5.4 Fire & Explosion Hazards:

If involved in a fire, the chemicals contained in the battery may decompose and produce toxic gases (e.g. Lithium oxides, cobalt oxides, carbon oxides, phosphorus oxides, and hydrogen fluoride). During a fire involving these products, the batteries may rupture and release diethyl carbonate, ethylene carbonate, and organic solvents. Diethyl carbonate, ethylene carbonate, and organic solvents are readily combustible. Care should be taken to avoid inhalation of fumes and skin and eye contact. Water applied to ruptured batteries may generate flammable hydrogen gas. In a confined space, smothering agents are recommended.

5.5 Extinguishing Methods:

Foam, CO2, ABC Dry Chemical, Water (flooding quantities only), Sand, powdered graphite, copper powder or soda (sodium carbonate)

5.6 Firefighting Procedures:

First responders should wear eye protection. Structural fire fighters must wear full protective equipment and self-contained breathing apparatus. Chemical resistant clothing may be necessary. Move containers from fire area if it can be done without risk to personnel. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained firefighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, rinse contaminated equipment with soapy water before returning to service.

6. ACCIDENTAL RELEASE MEASURES

6.1 Spills:
Before cleaning any spill or leak, individuals involved in spill cleanup must wear appropriate Personal Protective Equipment. In case of broken battery or electrolyte leakage, trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. Clear the affected area and protect people. Personal Protective Equipment should include, at least, double-gloves (rubber over latex gloves) and rubber apron, splash goggles or safety glasses. Monitor the area to determine the levels of vapors before personnel are allowed into the spill area. The atmosphere must have levels lower than those listed in Section 8, (Exposure Limits and Personal Protection) and at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA). Absorb spilled liquid with absorbent materials suitable for strong bases. Neutralize residue with citric acid solution or other neutralizing agent for basic materials. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residue in a suitable container. Dispose of in accordance with appropriate Federal, state, provincial and local regulations.

7. HANDLING & STORAGE INFORMATION

7.1 Work & Hygiene Practices:
Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or containers of this product. Avoid breathing gases generated by this product. Use in a well-ventilated location. Follow specific instructions for use supplied with product.

7.2 Storage & Handling:
Employees must be trained to properly use this product. Keep away from heat, sparks, and other sources of ignition. Do not allow metal objects to simultaneously contact both positive and negative terminal of battery. Do not charge in unventilated areas. Do not use organic solvents other than recommended chemical cleaners on battery. Store in a cool, dry, ventilated area away from combustible materials and away from material with which it is incompatible (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion resistant materials. Post warning and "NO SMOKING" signs in storage and use areas as appropriate. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Inspect all incoming packages before storage to ensure batteries are properly labeled and not damaged.

7.3 Special Precautions:
None

8. EXPOSURE CONTROLS & PERSONAL PROTECTION

8.1 Ventilation & Engineering Controls:
Use with adequate ventilation (e.g., open doors and windows, local exhaust ventilation). Ensure appropriate decontamination equipment is available (e.g., sink, safety shower, eye-wash station).

8.2 Respiratory Protection:
No special respiratory protection is required under typical circumstances of use or handling. In instances where vapors or sprays of this product may be generated, and respiratory protection is needed, use only protection authorized by 29 CFR §1910.134, applicable U.S. State regulations, or the Canadian CAS Standard Z94.4-93 and applicable standards of Canadian Provinces, EC member States, or Australia [NOHSC: 2007 (1994)].

8.3 Eye Protection:
Wear protective eyewear (e.g., safety glasses with side-shield) at all times when handling this product. Contact lenses pose a special hazard - soft lenses may absorb and concentrate irritants.

8.4 Hand Protection:
None required under normal conditions of use.

8.5 Body Protection:
No apron required when handling small quantities. If necessary,y, refer to appropriate Standards of U.S. OSHA, Canada, the European Standard CEN1TR 15419:2006, Standard 3765-Clothing for Protection Against Hazardous Chemicals, New Zealand standards, or Japanese standards. If a hazard of injuryy to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29CFR 1910.136 and the Canadian CSA Standard Z195-02, Protective Footwear.

HEALTH	1
FLAMMABILITY	0
REACTIVITY	0
PROTECTIVE EQUIPMENT	B

EYES	SKIN		

9. PHYSICAL & CHEMICAL PROPERTIES

9.1	Density:	**NA**
9.2	Boiling Point:	**NA**
9.3	Melting Point:	**NA**
9.4	Evaporation Rate:	**NA**
9.5	Vapor Pressure:	**NA**
9.6	Molecular Weight:	**NA**
9.7	Appearance & Color:	**Solid article, sealed cylindrical batteries**
9.8	Odor Threshold:	**NA**
9.9	Solubility:	**NA**
9.10	pH	**NA**
9.11	Viscosity:	**NA**
9.12	Other Information:	**NA**

10. STABILITY & REACTIVITY

10.1	Stability: **Stable under normal conditions of use (see section 7).**
10.2	Hazardous Decomposition Products: **Products of thermal decomposition can include produce toxic gases (e.g. lithium oxides, cobalt oxides, carbon oxides, phosphorus oxides, and hydrogen fluoride).**
10.3	Hazardous Polymerization: **Will not occur.**
10.4	Conditions to Avoid: **Exposure or contact to extreme temperatures, incompatible chemicals, sparks, open flame.**
10.5	Incompatible Substances: **Strong oxidizers, chlorine, peroxides or strong acids.**

11. TOXICOLOGICAL INFORMATION

11.1	Toxicity Data: **This product has NOT been tested on animals to obtain toxicology data. There are toxicology data for the components of the product, which are found in scientific literature. These data have not been presented in this document.**	
11.2	Acute Toxicity: **See section 2.5**	
11.3	Chronic Toxicity: **See section 2.6**	
11.4	Suspected Carcinogen: **Cobalt compounds are listed by the IARC as Category 2 (possibly carcinogenic to humans); ACGIH TLV-A4 (not classifiable as a human carcinogen). Fluorides are listed by ACGIH TLV-A4 (not classifiable as a human carcinogen).**	
11.5	Reproductive Toxicity: **NE**	
	Mutagenicity:	**This product is not reported to produce mutagenic effects in humans.**
	Embryotoxicity:	**This product is not reported to produce embryotoxic effects in humans.**
	Teratogenicity:	**This product is not reported to cause teratogenic effects in humans.**
	Reproductive Toxicity:	**This product is not reported to cause reproductive effects in humans.**
11.6	Irritancy of Product: **Misuse of these products, such as deliberate destruction, may release diethyl carbonate, ethylene carbonate, and organic solvents contained within the batteries that may result in irritation.**	
11.7	Biological Exposure Indices: **ACGIH Biological Exposure Indices (BEIs) have been determined for a component in this product. Fluorides: (urine) 3 mg/g creatinine (prior to shift), 10 mg/g creatinine (end of shift).**	
11.8	Physician Recommendations: **Treat symptomatically.**	

12. ECOLOGICAL INFORMATION

12.1	Environmental Stability: **NA**
12.2	Effects on Plants & Animals: **There is no specific data available for this product.**
12.3	Effects on Aquatic Life: **There is no specific data available for this product. Releases of large volumes may be harmful or fatal to overexposed aquatic life. Aquatic toxicity data for components of this product are available but are not presented in this MSDS.**

13. DISPOSAL CONSIDERATIONS

13.1	Waste Disposal: **Perchlorate Material - Special Handling May Apply - Dispose in accordance with local, state, provincial and federal hazardous waste laws. Check with the competent authority in your area for specific guidance and advice on local battery collectors and recyclers.**
13.2	Special Considerations: **Undamaged lithium ion batteries may be managed and disposed of as Universal Waste Batteries. Leaking lithium ion batteries must be managed as U.S. EPA Characteristic Hazardous Waste: D003 (Reactivity).** **United States: The Mercury-Containing and Rechargeable Battery Management Act (42 USC 14301) may be applicable to these batteries. The U.S. Federal Universal Waste Rule (40 CFR 273) may be applicable to the batteries when destined for recycling.** **Canada: As of February, y 2007, there are no national regulations for the disposal of batteries; however, some Canadian jurisdictions have implemented collection and disposal bans targeting batteries.** **European Union: Disposal of batteries is regulated by 91/157/EEC, 93/86/EEC, and 98/101/EEC. Member countries are responsible for establishing collection programs; therefore, check with the competent authority in your area for specific guidance and advice on local battery collectors and recyclers.** **Japan: The Law to Promote the Efficient Usage of Resources requires all manufacturers and importers of rechargeable batteries and equipment** **using rechargeable batteries to establish collection and recycling systems for the batteries. The Battery Association of Japan's (BAJ) Center to** **Promote Rechargeable Batteryy Recycling promotes the collection and recycling of batteries.** **Australia: The requirements of the Hazardous Waste Act 1989 may be applicable to wastes of these products.** **New Zealand: Batteries are on the New Zealand Waste list.**

14. TRANSPORTATION INFORMATION

The basic description (ID Number, proper shipping name, hazard class & division, packing group) is shown for each mode of transportation. Additional descriptive information may be required by 49 CFR, IATA/ICAO, IMDG and the CTDGR. All Zebra lithium batteries are tested and comply with the UN Manual of Test and Criteria, Part III, Subsection 38.3

14.1	49 CFR (GND): **UN3480, LITHIUM ION BATTERY, 9, EXCEPTED FROM REGULATION PER 49 CFR §173.185(b) NOTE: COMPLIES WITH SPECIAL PROVISION 188**
14.2	IATA (AIR): **UN3480, LITHIUM ION BATTERY, 9, EXCEPTED FROM REGULATION (EXCEPT WITHIN UNITED STATES) PER IATA PI965 SECTION IB. CARGO AIRCRAFT ONLY**
14.3	**IATA (AIR): UN3481, LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT, 9, IN COMPLIANCE WITH PACKING INSTRUCTION 967, SECTION II.**
14.4	**IATA (AIR): UN3481, LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, 9, IN COMPLIANCE WITH PACKING INSTRUCTION 966, SECTION II.**
14.5	IMDG (OCN): **UN3480, LITHIUM ION BATTERY, 9, EXCEPTED FROM REGULATION PER IMDG CODE SPECIAL PROVISIONS 188, 230**
14.6	TDGR (Canadian GND): **UN3480, LITHIUM ION BATTERY, 9, EXCEPTED FROM REGULATION PER TDGR SPECIAL PROVISIONS 188, 230**
14.7	ADR/RID (EU): **UN3480, LITHIUM ION BATTERY, 9, EXCEPTED FROM REGULATION PER ADR/RID SPECIAL PROVISIONS 188, 230**
14.8	SCT (MEXICO): **UN3480, BATERIA DE LITIO, 9, EXCEPTED FROM REGULATION PER SCT SPECIAL PROVISIONS 188, 230**

15. REGULATORY INFORMATION

15.1	SARA Reporting Requirements: **SARA 313 (cobalt compounds)**	
15.2	SARA Threshold Planning Quantity: **NA**	
15.3	TSCA Inventory Status: **All components of this product are listed in the TSCA Inventory or are exempt.**	
15.4	CERCLA Reportable Quantity (RQ): **NA**	
15.5	Other Federal Requirements: **NA**	
15.6	Other Canadian Regulations **This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The components of this product is listed on the DSL/NDSL. None of the components of this product are listed on the Priorities Substances List.**	
15.7	State Regulatory Information: **The following substances are listed on the following state criteria lists: Massachusetts Hazardous Substances List (graphite, carbonate, ethylene carbonate), Minnesota hazardous Substances List (graphite), Pennsylvania Hazardous Substances List (graphite, diethyl carbonate, ethylene carbonate).**	
15.8	67/548/EEC (European Union) Requirements: **The primaryy component of this product is listed in Annex I of EU Directive 67/548/EEC: Lithium Cobalt Oxide: Xn (Harmful). R: 20/22-43- Harmful by inhalation and if swallowed. Limited evidence of a carcinogenic effect. May cause sensitization by skin contact. S: 2-25 Keep out of reach of children. Avoid contact with eyes.**	

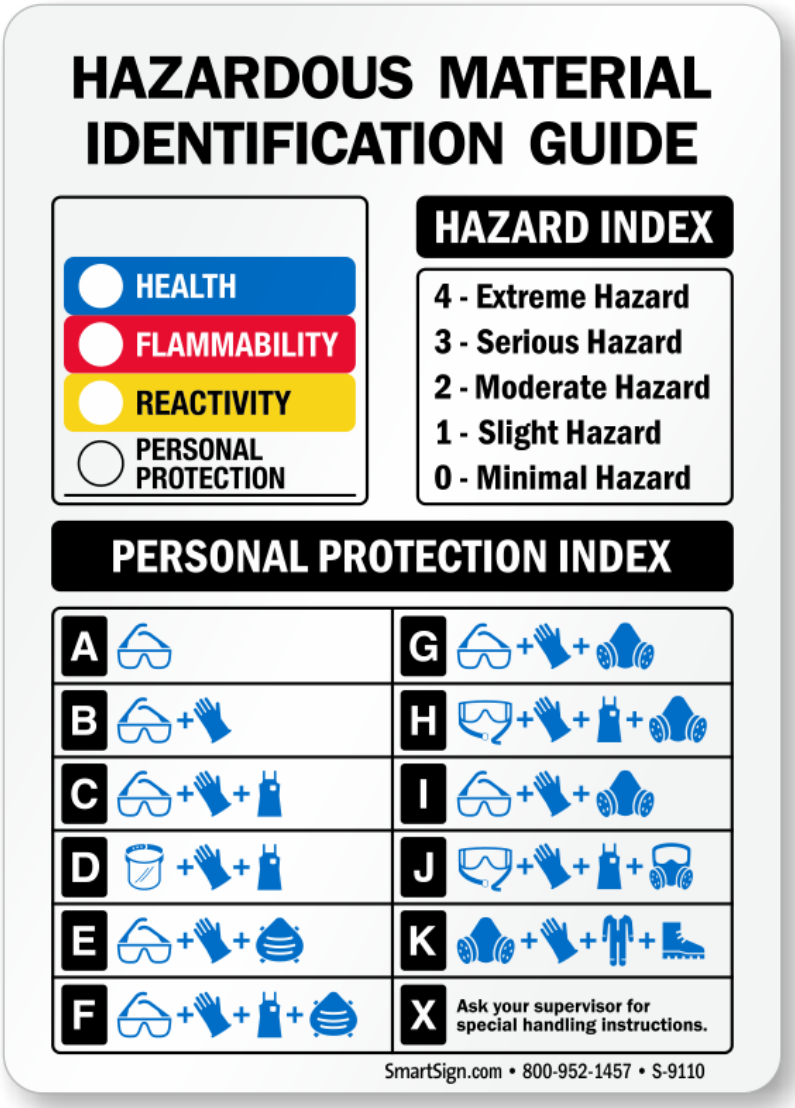
16. OTHER

16.1	Other Information: **Australia: components of these products listed by CAS No in Section 3 (Composition and Ingredients) are listed on the AICS. Graphite is listed in the HSIS. New Zealand: diethyl carbonate, ethylene carbonate, and polyvinylidene difluoride are registered as hazardous substances with the Environmental Risk Management Authority. Specific controls apply to diethyl carbonate and polyvinylidene difluoride and may apply to these products. (hazardous Substances and New Organisms Act, 1996). Japan: components of these products listed by CAS No in Section 3 (Composition and Ingredients) are listed on the ENCS Inventory. The components of these products listed by CAS No in Section 3 (Composition and Ingredients) are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese METI. Lithium Cobaltate is listed as Deleterious Substances under the Poisonous and Deleterious Substances Control Law.**	
16.2	Terms & Definitions: **See last page of this MSDS.**	
16.3	Disclaimer: This Material Safety Data Sheet is offered pursuant to Hazard Communication Standard, 29 CFR §1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of ShipMate's & Zebra's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either expressed or implied, are provided. The information contained herein relates only to the specific product(s). If this product(s) is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.	
16.4	Prepared for: **Zebra Technologies Corporation** **3 Overlook Point** **Lincolnshire, IL 60069** **+1 (866) 230-9494 phone** **+1 (847) 913-8760 fax** **http://www.zebra.com/**	ZEBRA
16.5	Prepared by: **ShipMate, Inc. 18436 Hawthorne Boulevard, Suite 201 Torrance, CA 90504** **+1 (310) 370-3600 phone +1 (310) 370-5700 fax http://www.shipmate.com/**	ShipMate Dangerous Goods Training & Consulting

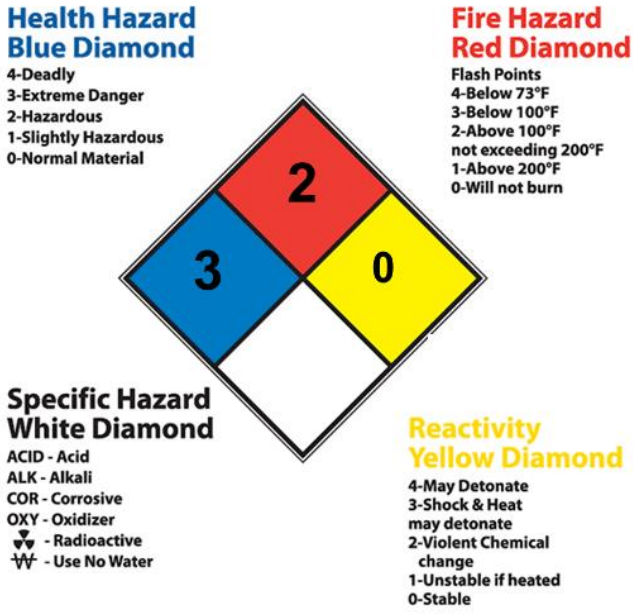
DEFINITIONS OF TERMS

ACGIH	American Conference on Governmental Industrial Hygienists
TLV	Threshold limit value
OSHA	Occupational Health and Safety Administration
PEL	Permissible exposure limit
IDLH	Immediately dangerous to life and health
NA	Not applicable
NR	No results
NE	Not established
ND	Not determined
ML	Maximum Limit
SCBA	Self-contained breathing apparatus
CPR	Cardiopulmonary resuscitation
UEL	Upper Explosive Limit
LEL	Lower Explosive Limit
PPM	Parts per Million

Hazardous Materials Identification System (HMIS). Health, flammability, & reactivity ratings and Personal Protective Equipment (PPE) index:



National Fire Protection Association (NFPA) Hazard Ratings:



REGULATORY INFORMATION:

CPR Canada's Controlled Product Regulations
DOT U.S. Department of Transportation
DSL Canadian Domestic Substance List
EPA U.S. Environmental Protection Agency
EU European Union (European Union Directive 67/548/EEC)
NDSL Canadian Non-Domestic Substance List
NOHSC Australia National Occupational Health & Safety Code
PSL Canadian Priority Substances List
TC Transport Canada
TSCA U.S. Toxic Substance Control Act
WHMIS Canadian Workplace Hazardous Material Information System

EC INFORMATION:

							
C	**E**	**F**	**N**	**O**	**T+**	**Xi**	**Xn**
Corrosive	Explosive	Flammable	Harmful	Oxidizing	Toxic	Irritant	Harmful

WHMIS INFORMATION:

							
A	**B**	**C**	**D1**	**D2**	**D3**	**E**	**F**
Compressed	Flammable	Oxidizing	Toxic	Irritation	Infectious	Corrosive	Reactive