

Reverse-S™ Cutting System

Installation & Operation Guide

Rayco Super RG 50



If you have any questions or concerns, *please call 1-800-473-3683*



BEFORE YOU BEGIN

Read these instructions completely and carefully

- **Note to installer** – Be sure to leave these instructions for the consumer's use
- **Note to consumer** – Keep these instructions with your Owner's Manual for future reference
- **Skill level** – Installation of the wheel requires intermediate mechanical skills. Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under any warranty
- **Helpful tips** – When installing a new v-belt it is recommended to check belt tension after 1 hour, 5 hours, 10 hours and 25 hours of machine operation as the belt will stretch.

IMPORTANT - Before you continue, please check the packing list to make sure it matches the contents of the boxes.



Disconnect Power

to machine to prevent any machine components from moving before proceeding. Failure to do so could result in death or serious injury.

FOR YOUR SAFETY read and observe all **CAUTIONS** and **WARNINGS** shown throughout these instructions. While performing the installations that are described in this booklet, gloves & safety glasses or goggles should be worn at all times.

Installation Preparation

TOOLS SUPPLIED:

½" Drive, ½" 6pt Impact Allen Wrench Socket

TOOLS YOU WILL NEED:

5/8" Socket Wrench

½" Drive Torque Wrench

¾" 6 Point ½" drive Socket

Green-Seize™

TORQUE SETTINGS:

900 Series Nut: 35ft. lbs. (47Nm)

LoPro™ Bolt (lubricated with **Green-Seize™**): 180ft. lbs.

LoPro™ Bolt (dry): 240ft. lbs.

MANUFACTURER'S PARTS LIST:

<i>Part Number</i>	<i>Description</i>
RS-6756	23"x1" Reverse-S™ Wheel
900-WS2	900 Series Wearsharp® 2-sided Tooth, for wheels 23" & larger
900LP-A	900 Series LoPro™ Pocket - Angle
900LP-S	900 Series LoPro™ Pocket - Straight
900LP-R	900 Series LoPro™ Pocket - Reverse
LP-212	LoPro™ Bolt, 2-1/2"
LP-234	LoPro™ Bolt, 2-3/4"
LP-300	LoPro™ Bolt, 3"
WB-1213314	Hex Head 1/2" - 13 x 3 1/4"
WW-12FW	1/2" 18-8SS Flat Washer
WN-1213	1/2" - 13 Lock Nut
C7015H	9" OD 6 Hole E Tapered Wheel Hub
HA-9625675	Hub Adapter Plate 9 OD x 6 ID x 1/2" 6 Bolt Hole 7.5" Pattern

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Table of Contents

Disassembly Instructions.....	4
<i>Reverse-S™</i> Wheel Assembly Instructions.....	8
Assembling the <i>Reverse-S™</i> wheel to Machine	9
<i>Reverse-S™</i> Drive Assembly Expanded View.....	11
<i>Reverse-S™</i> Wheel Assembly.....	12
Taper-Lock® Bushing Removal & Installation Instructions.....	13
Split Taper Bushing Removal & Installation Instructions	14
<i>Reverse-S™</i> Guarantee	15
Material Safety Data Sheet	17

Disassembly Instructions

1. Disconnect power to the machine.
2. Remove final drive cover bolts and cover. (Figure 1.1)



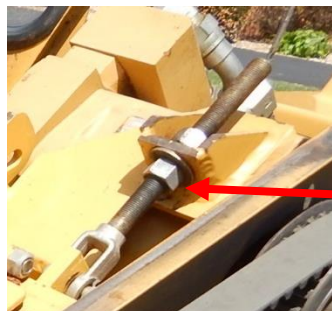
Figure 1.1

3. Loosen hydraulic motor mount guide nut. (Figure 1.2)



Figure 1.2

4. Loosen bottom nut on hydraulic motor mount tensioner. (Figure 1.3)



Tensioner
Nut

Figure 1.3

5. Pull down on top final drive sheave to loosen final drive belt. (Figure 1.4)

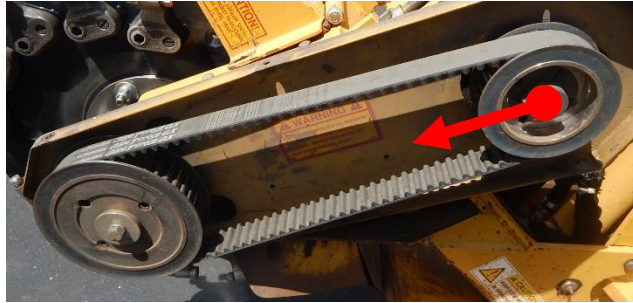


Figure 1.4

6. Measure from the back final drive cover to the front of bottom final drive sheave. Record this measurement here as you will need it for reassembly. (Figure 1.5)

Sheave Measurement Notes:



Figure 1.5

7. Remove the cutter wheel shaft bolt and bottom final drive sheave. **Follow Taper-Lock® bushing removal instructions on page 13.** (Figure 1.6)

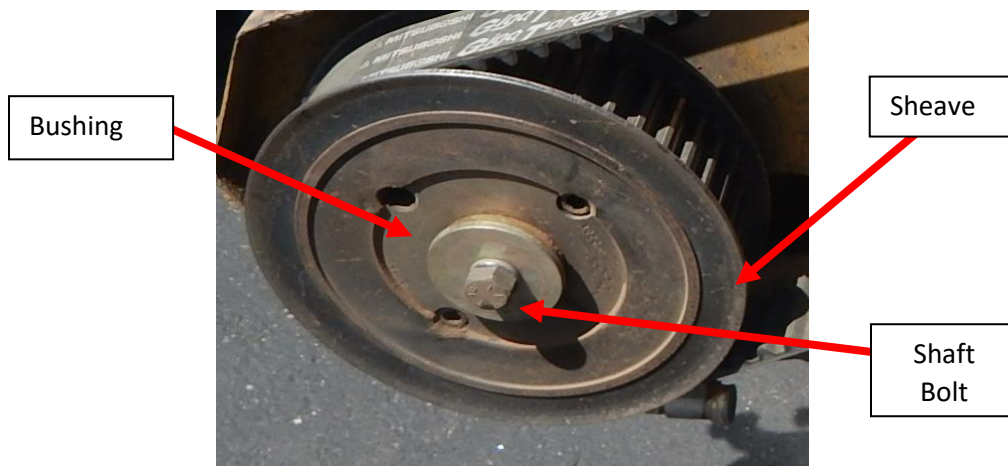


Figure 1.6

8. Loosen and remove the rear left and rear right pillow block bearing bolts.



Warning: The cutter wheel assembly weighs approximately 234 lbs. Use caution when loosening bolts. Cutter wheel assembly may drop unexpectedly. Floor jack or equivalent lowering device is recommended for easier removal. (Figure 1.7)

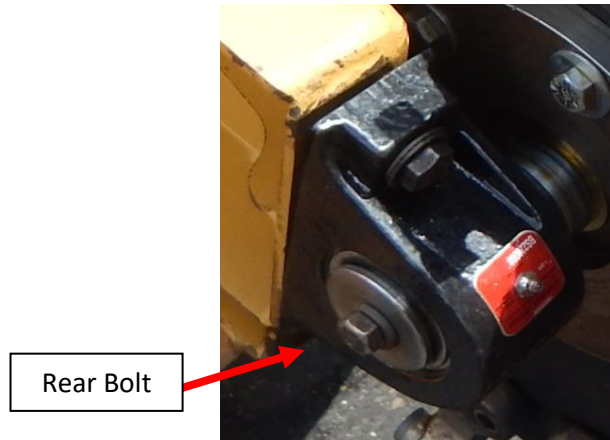


Figure 1.7

9. Loosen and remove the front left and front right pillow block bearing bolts.
10. Remove and lower cutter wheel assembly.
11. Loosen two (2) setscrews on left side bearing collar. (Figure 1.8)



Figure 1.8

12. Remove the left cutter wheel shaft bolt. (Figure 1.9)



Figure 1.9

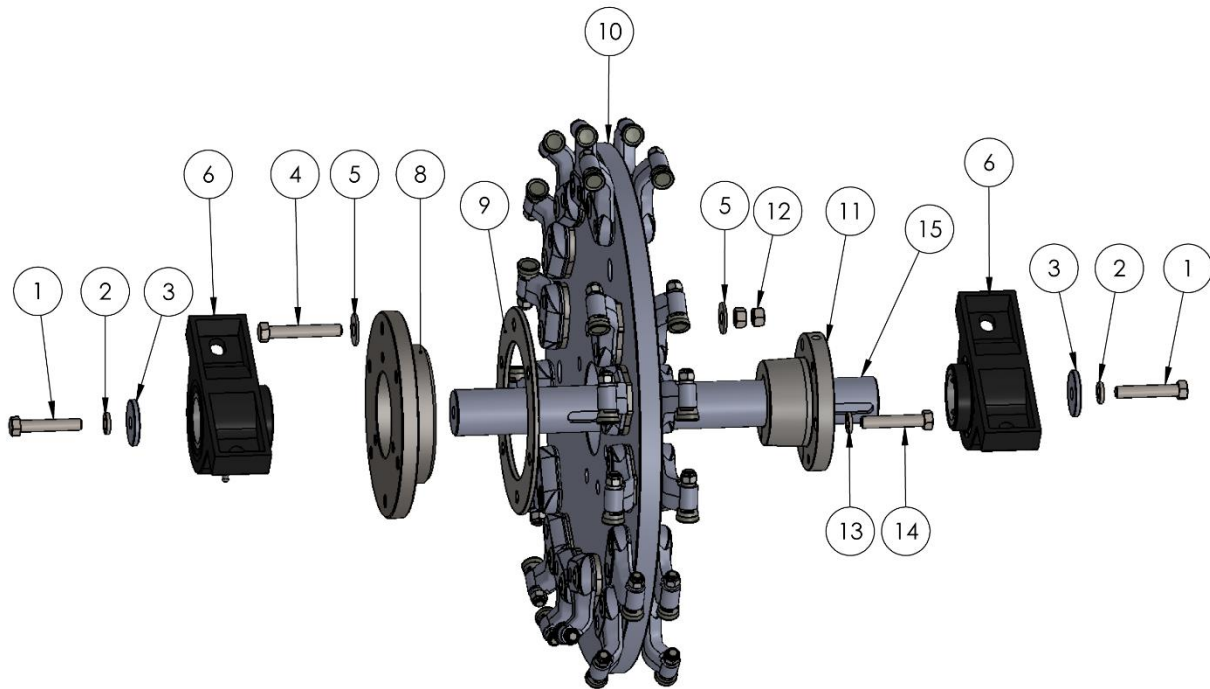
13. Remove the left bearing from the cutter wheel shaft. In some instances, bearings may need to be pressed off or cut away from the shaft. A bearing puller is recommended for removal of bearings. (Figure 1.10)



Figure 1.10

14. Remove the cutter wheel from the cutter wheel bushing. **Follow Split Taper bushing removal instructions on page 14.**

Reverse-S™ Wheel Assembly Instructions



(Use Figure 2.1 for the next 7 steps)

1. Place hub adapter plate (9) onto the right side of wheel hub (8), lining up bolt holes.
2. Line up bolt holes of the wheel hub (8) and hub adapter plate (9) and the **Reverse-S™** Wheel (10) on the left side of the **Reverse-S™** Wheel (10) using nuts (16), bolts (4) and washers (5).
3. Using the nuts (16), bolts (4) and washers (5) mount the wheel hub (8) and hub adapter plate (9) to the **Reverse-S™** Wheel (10).
4. Thread nuts (16) to bolts (4) and torque down firmly.
5. Mount the **Reverse-S™** Wheel (10) to the cutter wheel bushing (12). **Do not tighten bushing completely.**
6. With the bearing collar facing the **Reverse-S™** wheel, slide the left bearing (6) onto the cutter wheel shaft. Tighten two allen head set screws in the bearing collar.
7. Reinstall cutter wheel shaft bolt (1), ½" lock washer (2), and shaft washer (3) to the cutter wheel shaft (15).

Assembling the *Reverse-S*[™] wheel to Machine

1. With the bolt holes from the bearings lined up with those on the machine, set cutter wheel in place onto machine. **Floor jack or equivalent lifting device is recommended for easier installation.**
2. Loosely reinstall the bearing mounting bolts on the right side of wheel.
3. Loosely reinstall the bearing mounting bolts on left side of wheel.
4. Place final drive belt and bottom final drive sheave into final drive assembly.
5. Align & tighten all 4 bearing mounting bolts.
6. With the *Reverse-S*[™] slightly off center to the left, thread cutter wheel bushing bolts $\frac{1}{4}$ of a turn evenly around the bushing. After each rotation of the wheel, check center position of the wheel to ensure proper centering. Adjust the wheel assembly as needed to maintain proper centering. Tighten bushing bolts completely as outlined in the **Split Taper bushing removal instructions on page 14.**
7. Reinstall bottom final drive tapered bushing & sheave to the previously recorded measurement in step 6 of the disassembly instructions. **Follow Taper-Lock[®] bushing installation instructions on page 13.** (Figure 3.1)



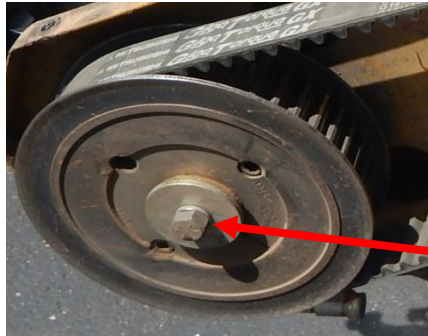
Figure 3.1

8. Once bottom final drive sheave is installed, double check the measurement from the back final drive cover to front of bottom sheave to ensure even alignment. (Figure 3.2)



Figure 3.2

9. Reinstall right cutter wheel shaft end bolt. (Figure 3.3)



Shaft
Bolt

Figure 3.3

10. Tighten hydraulic motor mount tensioner nut until belt is properly tensioned. (Figure 3.4)



Figure 3.4

11. Manually rotate **Reverse-S™** wheel several times and visually ensure final drive belt maintains center position to both final drive sheaves. If final drive belt does not maintain center position to final drive sheaves, then adjustments will need to be made. Loosen the bottom final drive sheave bushing and repeat step 7 until final drive belt maintains center position on final drive sheaves.

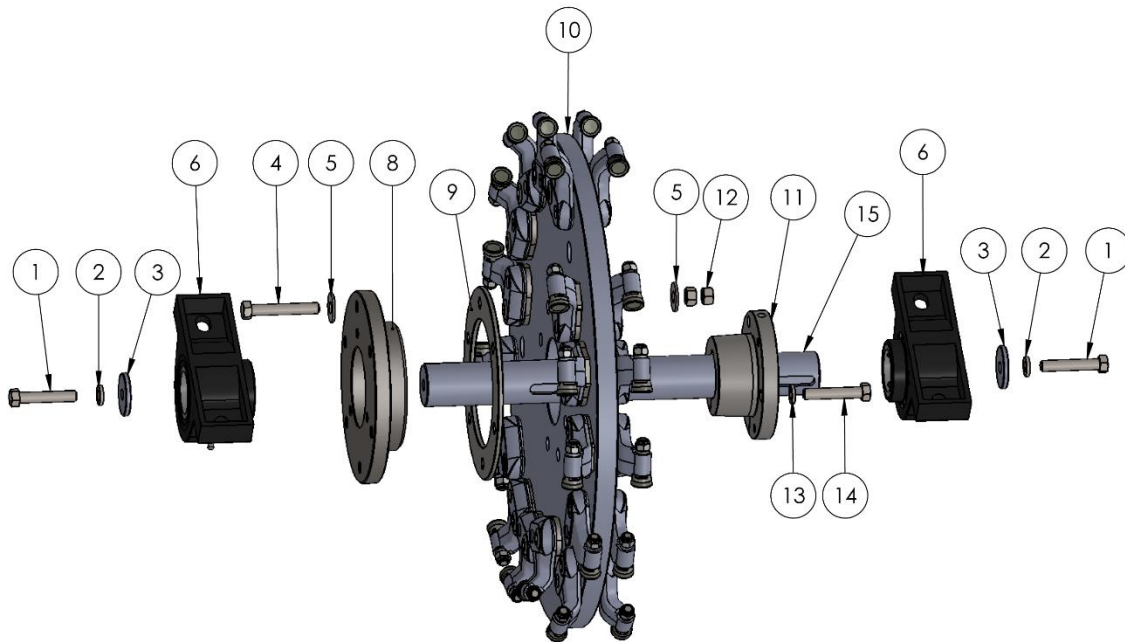
12. Tighten hydraulic motor mount guide nut. (Figure 3.5)



Figure 3.5

13. Reinstall final drive cover.
14. Reconnect power to machine.
15. Start machine engine and engage the **Reverse-S™** wheel.
16. Ensure there are no unusual noises emanating from the machine.

Reverse-S™ Drive Assembly – Expanded View²



Reverse-S™ Drive Assembly			
Item #	Part #	Description	Qty
1		Hex Bolt 1/2 - 13 X 1-1/2	2
2		1/2 Lock Washer	2
3		Shaft Washer	2
4		Hex Bolt 1/2 - 13 X 3-1/4	6
5		1/2 Washer	12
6		PB Bearing	2
8		Cutter Wheel Hub	1
9		Hub Adapter Plate – ¼"	1
10		Reverse-S™ Wheel²	1
11		"E" Bushing	1
12		1/2 – 13 Nut	12
13		1/2 Lock Washer	3
14		Hex Bolt 1/2 - 13 X 2-3/4	3
15		Cutter Wheel Shaft	1

²After Grinding First Stump Ensure **LoPro™** bolts & **Greenteeth®** Have Maintained Proper Torque.

4

3

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Reverse-S™ Wheel Assembly

PROPRIETARY AND CONFIDENTIAL
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CUMMINS INC. AND IS NOT TO BE
REPRODUCED OR TRANSMITTED IN ANY
FORM OR BY ANY MEANS, ELECTRONIC
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Taper-Lock® Bushing Removal & Installation Instructions



Warning: Use of Anti-Seize lubricant on tapered cone surfaces or on bolt threads when mounting may result in damage to sheaves. This voids all manufacturers' warranties.

1. To remove from shaft:
 - a. Remove all screws.
 - b. Insert screws in holes indicated by ● on drawing (Figure 4.1). Loosen bushing by alternately tightening screws by following torque specs (Table 1.1).
2. Installation Instructions:
 - a. Clean shaft, bore of bushing, outside of bushing, and hub bore of all oil, paint, and dirt. File away burrs.
 - b. Insert bushing into hub. Match the hole pattern, not threaded holes. Each complete hole will be threaded on one side only.
 - c. Lightly oil setscrews and thread into those half-threaded holes indicated by ○ on drawing (figure 4.1).

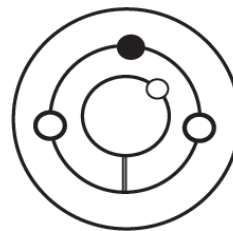
CAUTION: Do not lubricate the bushing taper, bushing bore, hub taper or the shaft. Doing so could result in breakage of the product.
 - d. Position assembly onto shaft allowing for the small axial movement which will occur during lightening procedure.
 - e. Alternately torque setscrews to recommended torque setting in chart below.

CAUTION: Do not use worn hex key wrenches. Doing so may result in a loose assembly or may damage screws.
 - f. To increase gripping force, lightly hammer face of bushing using drift or sleeve. Do not hit bushing directly with hammer.
 - g. Re-torque screws after hammering.

CAUTION: Where bushing is used with lubricated products such as chain, gear or grid couplings be sure to seal all pathways (where lubrication could leak) with RTV or similar material.
 - h. Recheck screw torques after initial run-in, and periodically thereafter. Repeat steps e, f and g, if loose.

Insert Screw Torque Table	
Bushing Type	Wrench Torque ft./lbs.
3020	66.7

Table 1.1



3020

○ Insert Screws to Install ● Insert Screws to Remove

Figure 4.1

Split Taper Bushing Removal & Installation Instructions



Warning: Use of Anti-Seize lubricant on tapered cone surfaces or on bolt threads when mounting may result in damage to sheaves. This voids all manufacturers' warranties.

1. To Remove From Shaft:
 - a. Remove capscrews and insert them into tapped holes in bushing flange. (Figure 5.1)
 - b. Tighten progressively until bushing disengages.
 - c. Remove assembly from shaft.
2. Installation Instructions:
 - a. Wipe bushing barrel, bushing bore and shaft clean with a soft dry cloth. Remove paint & other foreign material from bore of mating part. **Do not lubricate bushing, bore of mating part, shaft or capscrews.**
 - b. Put bushing loosely into hub. Start capscrews by hand, turning them just enough to engage threads. Do not use a wrench at this time.
 - c. Slide assembly onto shaft. Line up drive components.
 - d. Tighten capscrews progressively with a torque wrench until each has been tightened to correct torque. (Table 2.1)

Bolt Torque Table		
Bushing Type	Cap Screw Size	Wrench Torque ft./lbs.
E	1/2 - 13	60

Table 2.1



Figure 5.1
(Bushing Only Pictured)

Green Manufacturing Guarantee

SATISFACTION GUARANTEE FOR WHEELS:

If you purchase a **Greenwheel®**, **Quadwheel®** or **Reverse-S™** Cutting System and are not completely satisfied with its performance, please contact Green Manufacturing at 800.473.3683 to request a return authorization within **90 days** of purchase date for a product refund or exchange.

SATISFACTION GUARANTEE FOR NEW SETUPS:

If you purchase a **Greenteeth®** setup, Upgrade Kit or **Greenteeth®** Replacement Wheel and are not completely satisfied with its performance, please contact Green Manufacturing at 800.473.3683 to request a return authorization within **30 days** of purchase date for a product refund or exchange.

WARRANTY:

If you are not completely satisfied with your purchase, please contact Green Manufacturing, Inc. at 800.473.3683 to request a return authorization within 30 days of purchase date for a product refund or exchange. We strive to provide exceptional quality products. Our products undergo a stringent quality control process, however if you feel that there is an issue with the quality of your product, please contact Green Manufacturing, Inc. immediately. We will accept unused parts for return or exchange for up to 30 days from the date of purchase with proof of purchase included with the return.

Seller's warranties against defects and non-conformities and defects shall continue to apply only so long as the Goods: (i) have been installed, maintained and used in conformity with instructions furnished by Seller from time to time, if any, and otherwise in conformity with the highest industry practices; (ii) have been subjected to normal use for the purpose for which the Goods were designed; (iii) have not been subjected to misuse, negligence or accident; (iv) have not been altered or repaired by persons other than Seller or Seller authorized warranty service providers in any respect which, in the judgment of Seller, adversely affects the condition or operation of the Goods; and (v) have been fully paid for. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, INDIRECT, EXEMPLARY, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE LOSSES OR DAMAGES (INCLUDING, WITHOUT LIMITATION, BUSINESS INTERRUPTION, REVENUE OR PROFITS, FEES OR FINES), EVEN IF SELLER HAS BEEN ADVISED OR MADE AWARE OF THE POSSIBILITY OF ANY SUCH LOSSES OR DAMAGES AND REGARDLESS OF WHETHER THE CLAIM IS BASED ON CONTRACT, TORT, STRICT LIABILITY, OR OTHER THEORY OF LIABILITY. Seller's cumulative liability for all losses and damages under these General Terms and Conditions or under any of the Related Agreements (including, without limitation, those arising out of contract tort (including negligence), strict liability, warranty, or other theory of liability) shall not exceed (a) in the case of any services provided or to be provided by Seller, the amount of the fees payable by Buyer for such services under the applicable Related Agreement, and (b) in the case of any products or devices provided or to be provided by Seller, the amount of Seller's labor services associated with the product sale. Seller reserves the right to make, without notice to Buyer, alterations to a product that do not materially affect agreed specifications or the product's form, fit or function.

The Reverse-S™ is proudly manufactured in the USA.

Green Manufacturing, Inc.
9650 Packard Rd
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MATERIAL SAFETY DATA SHEET

I - PRODUCT IDENTIFICATION

Trade Name: Tungsten Carbide **Chemical Family:** Refractory Metal Alloy

Chemical Formula: WC **CAS#:** 12070-12-1

II - HAZARDOUS INGREDIENTS

Hazardous Components % OSHA/PEL ACGIH/TLV Sec. 302 Sec. 304 Sec. 313

Tungsten Carbide 0-100 N/E N/E No No No

Tungsten compounds 0-100 5 mg/m³ C - 1 0 mg/m³ No No No

HM IS Ratings (0-4): Health: 3 **Flammability:** 0 **Reactivity:** 0

HM IS Protective Equipment: H: glasses, gloves, clothing, combo respirator

III - PHYSICAL DATA

Boiling Point: 6000 oC **Melting Point:** 2820 - 2940 oC

Evaporation Rate: N/A **% Volatiles:** N/A

Solubility in H₂O: Insoluble **Vapor Pressure:** N/A

Vapor Density: N/E **Specific Gravity:** 13.6 gm/cc at 18 oC

Appearance and Odor: Grey to black powder, odorless **Molecular Weight:** 195.86

IV - FIRE AND EXPLOSION HAZARDS DATA

Flash Point: N/A **Flammability:** Non-Flammable

Explosive Limits: Lower: N/A **Upper:** N/A

Extinguishing Media: Use suitable extinguishing media for surrounding materials and type of fire.

Special Fire Fighting Procedures: Firefighters must wear full face, self-contained breathing apparatus with full protective clothing to prevent contact with skin and eyes. Fumes from fire are hazardous. Isolate runoff to prevent environmental pollution.

Unusual Hazard: Dusts may present a fire or explosion hazard under rare favoring conditions of particle size, dispersion, and strong ignition source. However, this is not expected to be a problem under normal handling conditions.

V - HEALTH HAZARD INFORMATION

Routes of Entry: Inhalation, ingestion, skin or eye contact (for dusts, mists, powder, and fume).

Effects of Overexposure: Industrially tungsten does not constitute an important health hazard. Exposure is related chiefly to the dust arising out of the crushing and milling operations. Chronic inhalation of the dust may cause lung damage in humans. Heavy exposure to the dust or the large amounts of the soluble compounds produces changes in body weight, behavior, blood cells, choline esterase activity and sperm in experimental animals.

Acute Effects:

Inhalation: Toxic by inhalation. May cause irritation to the mucous membranes, coughing, dyspnea, soreness in the chest, weight loss, hemoptysis, bronchitis, asthma, pulmonary fibrosis and radiological changes in the lungs.

Ingestion: May cause irritation to the gastrointestinal tract and diarrhea.

Skin: May cause irritation.

Eye: May cause irritation.

Chronic Effects:

Inhalation: May cause damage to the lungs.

Ingestion: No chronic health effects recorded.

Skin: May cause dermatitis, sensitization and eczema.

Eye: May cause conjunctivitis.

Medical Conditions Generally Aggravated by Exposure: Pre-existing respiratory and skin disorders.

Target Organs: May affect the respiratory system.

Carcinogenicity: NTP: No IARC: No OSHA: No

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove victim to fresh air. Keep warm and quiet, give oxygen if breathing is difficult and seek medical attention.

INGESTION: If conscious, give 1-2 glasses of milk or water and induce vomiting (Never induce vomiting or give anything by mouth to an unconscious person). Seek medical attention.

SKIN: Remove contaminated clothing from affected area, brush material off skin. Wash affected area with mild soap and water. Seek medical attention if symptoms persist.

EYE: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms persist.

VI - REACTIVITY DATA

Stability: Stable

Conditions to Avoid: None

Incompatibility (Material to Avoid): Chlorine, fluorine, nitrogen dioxide, nitrous oxide, iodine pentafluoride and lead oxide.

Hazardous Decomposition Products: None recorded.

Hazardous Polymerization: Will not occur

VII - SPILL OR LEAK PROCEDURES

Steps to Be Taken in Case Material Is Released or Spilled: Wear appropriate respiratory and protective equipment specified in Section VIII. Isolate spill area and provide ventilation. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust.

Waste Disposal Method: Dispose of in accordance with all local, state, and federal regulations.

VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection: NIOSH approved dust, mist, and vapor cartridge respirator.

Ventilation: Use local exhaust ventilation which is adequate to limit personal exposure to airborne dust levels which do not exceed the appropriate PEL or TLV. If such equipment is not available, use respiratory protection as specified above.

Protective Gloves: Rubber gloves.

Eye Protection: Safety glasses.

Other Protective Clothing or Equipment: Protective gear suitable to prevent contamination.

IX - SPECIAL PRECAUTIONS

Precautions to Be Taken in Handling and Storage: Store in a tightly sealed container in a cool, dry, well-ventilated area. Wash thoroughly after handling.

Other Precautions: Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. Green Manufacturing, Inc. shall not be held liable for any damage resulting from handling or from contact with the above product.