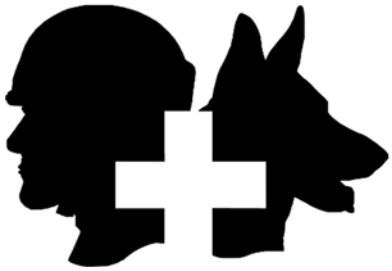
TRAUMA F/X®

Improving Survivability



CLINICAL RESPONSE LOWER (CRL)

Clinical Response Lower (CRL) Medical Simulator User Guide

Rev_Q2_2020

TRAUMA F/X®

Improving Survivability

TraumaFX®

Clinical Response Lower (CRL)

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Chapter 1

Chapter 1: Introduction

About the Clinical Response Lower (CRL)

The Clinical Response Lower (CRL) is a ruggedized, tetherless medical training manikin that delivers powerfully realistic simulations of lower unit blast injuries commonly caused by Improvised Explosive Devices (IEDs) and other blast sources, combined with advanced features for prolonged field care and clinical environments. Jointly developed by TraumaFX Solutions and the U.S. Army Simulation and Training Technology Center, the CRL employs state-of-the-art special effects materials and technologies to deliver incredibly realistic visual and tactile stimuli with lifelike response to treatment. The CRL features a hemostatic wound that when packed and when pressure is applied with sufficient force for the appropriate amount of time, the bleeding will stop. Tourniquets must be applied with realistic force to control hemorrhaging to the right leg amputation, and trainees can use field techniques such as hand, knee and elbow pressure on arterial pressure points to occlude bleeding. Rounding out the CRL's already robust features femoral and pedal pulses, IM injection sites, a tibial IO site, and a Foley catheter simulation site. CRL's unparalleled ruggedness allows it to be carried and dragged through inhospitable field training environments without damage, making it ideally suited for use in Tactical Combat Casualty Care, (TCCC) and Combat Lifesaver courses. CRL is part of a generation of the first anthropomorphic trauma simulators to implement animatronic movement of injured limbs, significantly increasing the realism and appropriate difficulty of treatment. Extraordinary realism provides desensitization to traumatic amputation injuries allowing Medics, Corpsmen, Soldiers, and other first responders to perform lifesaving tasks more efficiently and effectively in the field, leading to significant improvement in the treatment of blast injuries.

The CRL is designed for rugged use in realistic training environments. To ensure proper operation, do not subject the CRL to unnecessarily harsh treatment. Care for the CRL as you would a live patient. Also, careful preventive maintenance and frequent after-use inspection is essential to ensure the service life of your trainer(s). Please review ***Chapter 5: After Use Care*** which outlines the standard preventive maintenance required under the terms of the CRL limited warranty.

Item Checklist

The components listed below (Figure 1) are required to set up and operate your CRL unit and come standard with each CRL trainer purchase. Optional components may or may not be included – check your order or packing lists to determine if any optional components were purchased.

Standard Components

CRL Lower unit

Radio Control (RC) Transmitter

Blood Filling System

1 Gallon Blood Mix Packets (10)

1 Gallon Blood Paste (Coagulated)

18v Li-ion Batteries (3)

Li-ion Battery Charger

Urine Fill Syringe

IM Skin Plugs

Femoral Pulse Point Skin Plug

Figure 1

Other standard components not shown

- Operating Manual – Makita Battery Charger
- Replacement O-rings
- Allen wrench
- Blood stir sticks (2)
- Urine Filling System (1 gallon)
- Urine Mix
- Tibial I/O Cap (left)
- Replacement filters (2)

Optional Components

- AirwayPlus Lifecast (with or without Abdominal Evisceration)
- AirwayPlus Lifecast – Pulses/Breathing
- Clinical Response Upper (CRU)
- Clinical Response Upper – Resuscitate (CRU-R)
- Emergency Medical Trauma Trainer – Tactical Medical Upper (EMITT-TMU)
- Emergency Medical Trauma Trainer – Active Shooter Upper (EMITT-ASU)
- Priapism Attachment (indicating a potential spinal cord injury)
    - Includes Allen wrench for attachment
- Flesh Chunks
- Severed Leg with Boot (Right)

System Overview

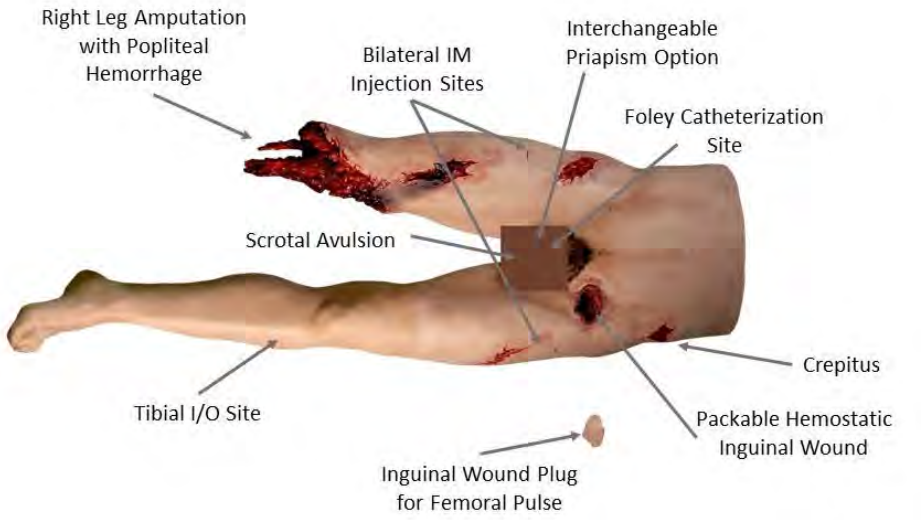

Figure 2

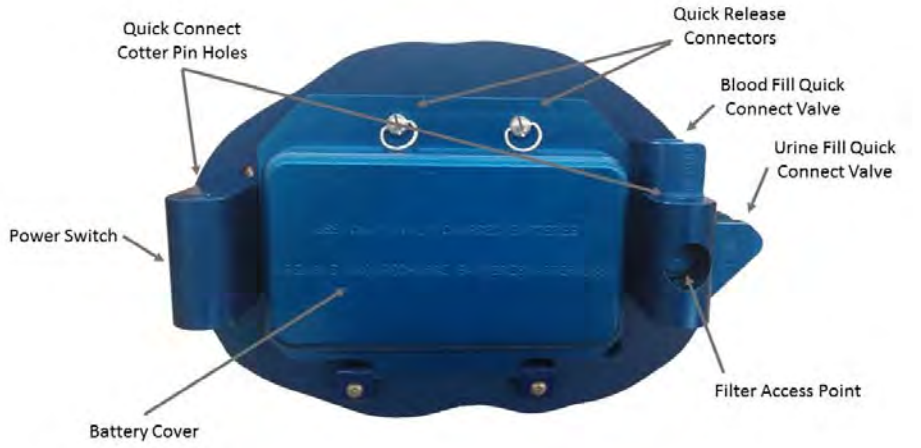

Figure 3

Special Notes and Cautions

Read all TraumaFX® and Third Party user instructions and manuals before attempting to assemble, install or operate the Clinical Response Lower (CRL) or accessories.

Latex Allergy Alert

The tubing used in the CRL's bleeding system is surgical quality and contains latex. A small portion of the tubing is exposed externally at the hemorrhage point on the right leg.

Individuals with latex allergies or sensitivities should use proper precautions before operating, treating, or attempting to repair the unit.

After Use Care

The CRL is designed for rugged use in realistic training environments. To keep the CRL working optimally, careful preventive maintenance and frequent after-use inspection will extend the service life of the CRL, and is required under the terms of the limited warranty. Please review ***Chapter 5: After Use Care*** which details the tasks to perform at the end of every training session.

Water Resistance and Cleanup

DO NOT USE PRESSURIZED WATER OR SUBMERGE CRL UNDER WATER. REMOVE BATTERIES BEFORE CLEAN UP TO AVOID ELECTRIC SHOCK!

The CRL is water resistant, not waterproof. Avoid direct water contact with the battery compartment, bone end, and penis area. Wash the CRL carefully after each use with clean water only. The CRL can be washed off with a soft wet cloth or sponge; however, vigorous scrubbing of the legs will remove leg hair. Simulated blood should be washed out of clothing as soon as possible preferably within 24 hours to avoid staining; pre-treatment of stains and vigorous cleaning will usually remove stains caused by the simulated blood.

Possible Reaction to Synthetic Blood Mix

The chemical components that comprise TraumaFX' organic dye blood mix may cause skin and eye irritation for some users. Avoid ingestion or inhalation. If eye contact occurs, check for and remove any contact lenses, immediately flush eyes with water for at least 15 minutes; cold water may be used. Get medical attention if irritation occurs. Should skin contact occur and the skin becomes irritated, wash with soap and water. Get medical attention if irritation persists. If blood powder is accidently inhaled, remove victim to fresh air. If breathing difficulties occur, seek medical attention immediately. If blood mix is ingested (powder or liquid form), DO NOT induce vomiting unless directed to do so by a physician. Never give anything by mouth to an unconscious

person. Loosen tight clothing such as a collar, tie, belt, or waistband. Immediately get medical attention.

System Weight

The CRL trainer is designed to replicate the weight and feel of a live human patient. To prevent injury, use caution and proper procedures when lifting or carrying the manikin or cases.

Simulated Blood

Only use TraumaFX-provided simulated blood and blood mixes in the CRL unit. Use of other liquids or the addition of any substance, including detergents, to the blood mix may damage internal components and will void the manufacturer's limited warranty.

To preserve the life of the simulated blood paste, please store in a dark, cool location.

Radio Control

The Radio Control (RC) system used to operate CRL has an extended range (see technical specifications) and can be used indoors or outdoors. Note that indoor range is subject to building design and construction materials. Test system operations whenever setting up in a new location or moving to a different area of a building.

Third Party User Manuals

The CRL trainers use third-party commercially available equipment. Where such equipment is provided, the associated user manuals and any pertinent documentation are provided as well.

Storage

The CRL unit, accessories, and fluids should be stored in a cool, dry location.

Compliance

If CRL is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Chapter 2

Chapter 2: Clinical Response Lower (CRL) Features

This section describes the highly realistic features of the CRL that contribute to the unique training experience the CRL trainer provides.

Ruggedized, Realistic Synthetic Skin

The outer skin of the CRL is designed to provide the "look-and-feel" of real skin and incorporates many of the Deformities, Contusions, Abrasions, Punctures/ Penetrations, Burns, Tenderness, Lacerations and Swelling (DCAP-BTLS) features for realistic medic trauma training. The skin is very rugged, but must be maintained regularly to ensure longevity. The CRL simulated skin is made of a proprietary silicone compound, and features realistic hair and wounds including simulated burns, lacerations, and penetrating blast fragments.

Material

The CRL skin is made of a silicone-based compound that requires cleaning with water only. This simulated skin covers the entire CRL unit.

Packable Hemostatic Wound

The CRL offers a packable hemostatic wound to incorporate advanced sensor technology, providing the trainee with immediate feedback of their efforts. The wound at the left inguinal crease contains a packable wound with sensor that identifies if the right amount of pressure is being applied to the wound for an adequate amount of time. If the trainee meets both the pressure and time requirements, the bleeding will occlude and the CRL will live to fight another day. However, if the pressure and time requirements are not to standard, then the CRL will die, as indicated on the feedback received by the CRL transmitter. This is valuable measured feedback that can be shared with the trainee.

Amputation Wounds

The CRL provides a realistic amputation wound on the right leg that features a bias wound with extended bone fragments and a popliteal artery hemorrhage. The right leg has an anatomically correct femoral pressure point that will occlude bleeding via proper tourniquet application or through pressure applied by the user. The CRL also features an optional severed leg segment with boot, and various skin and body pieces that can be scattered throughout the training area around the CRL unit to increase the

realism of the training experience and provide teaching points regarding the collection and treatment of severed body parts.

Foley Catheterization

The CRL features a Foley catheterization training site with an internal bladder for storing simulated urine. The Foley catheter is placed within the penis, and urine will flow when it is inserted properly. The urine can be colored as desired to simulate specific physiologic events.

Bilateral Intra-Muscular Injection Sites

The CRL features bilateral sites for intramuscular injection; these are located on the sides of the thighs. Fluids can be injected into the sites, and both sites drain out the legs. The skin plugs can be used many times before replacement is needed.

Femoral and Pedal Pulses

The CRL has palpable bilateral femoral pulses and a pedal pulse in the intact left foot. The left femoral pulse is generated through an insert into the hemostatic inguinal wound; when the wound is in use for a particular scenario, there will be no femoral or pedal pulse on the left side. When not in use, the insert is placed within the wound and the femoral and pedal pulses on the left can be palpated.

Tibial Intraosseous Infusion Site

The CRL features an intraosseous (IO) access site on the left tibia. The site is equipped with a skin plug over a simulated bone plug, and can be used with either manual or powered introducing devices. The site can be infused, with all introduced fluids draining out the heel.

DCAP-BTLS Wounds

The CRL provides realistic examples of DCAP-BTLS. These include multiple abrasions, lacerations, and burn marks across both legs, a simulated shrapnel fragment lodged within the CRL's upper leg, and a scrotal avulsion. The CRL's upper left hip features a simulated crepitus (crackling) to cue for a crushed pelvis.

Penis, Priapism, and Vagina

The CRL comes with a standard flaccid penis. An optional priapism attachment is available to cue for spinal cord injury. Additionally, and optional vagina is available; this can be catheterized as described in the section on Foley Catheterization.

Cautions and Care

The CRL unit is water resistant, but not waterproof. Avoid direct water contact with the battery compartment, bone end, and penis area. When washing the CRL, use only water. Never use ink or marker to write on the CRL. Doing so can cause damage to the CRL's surface during removal.

When washing the CRL, use caution to prevent water from entering the mechanical and electrical areas of the unit – the battery compartment should be closed and

secured before cleaning. Always use gentle pressure and avoid vigorous scrubbing of the legs as this may remove leg hair.

Often in live training scenarios, the CRL's simulated blood may come into contact with a user's clothes. To reduce the risk of staining, simulated blood should be treated with detergent and be washed out of clothes within 24 hours of exposure.

Animatronics

The CRL features realistic movement in the legs to provide an appropriate level of difficulty in treatment. This movement is operated by a Radio Control (RC) transmitter.

Materials

The internal structure of the CRL's lower unit is composed of a heavy-duty anodized aluminum yoke, surrounded by a rugged core, and layered with realistic silicone-based skin. This construction results in a high-fidelity look and feel with exceptional durability that allows the CRL to be carried or dragged on many surfaces such as outdoors or various flooring commonly found in buildings. Though highly ruggedized, do not subject the CRL to severely damaging conditions; users must treat the CRL as they would care for a human patient. Failure to do so can void the CRL limited warranty.

The structure and joints do not require lubrication of any kind so do not attempt to lubricate the CRL.

Leg Movement

The CRL's legs move in response to trainer commands via the Radio Control system. The CRL's legs can move laterally or up and down. These motions simulate the movement and strength of injured individuals to provide a more realistic and appropriately difficult treatment scenario. The movement mechanism in the CRL is mechanically isolated from exterior forces.

The animatronic system is also equipped with clutches to prevent damage to the CRL due to excessive force (such as may be applied to stabilize legs during treatment). If clutches engage, users may feel and hear a "pop" from within the unit. This is normal and not indicative of damage. However, if the clutches do engage, operators should recognize this as a safety release feature and reduce range of motion appropriately (as a patient would react) until movement is less restricted.

Clutches may also engage if the CRL's legs are forced out of position. This will cause the legs to temporarily disengage from the movement mechanism to prevent damage. If this occurs, simply move the joystick on the RC transmitter through its range of motion (both vertical and horizontal) and the mechanism will quickly re-engage.

Bleeding System

ALLERGY WARNING: The tubing used in the CRL's bleeding system is surgical quality and contains latex. A small portion of the tubing is exposed externally at hemorrhage points on the right leg. Individuals with latex allergies or sensitivities should use proper precautions before operating, treating, or attempting to repair the unit.

The CRL provides realistic physiological response to treatment. During training exercises, proper wound packing with applied pressure combined with the application of tourniquets or pressure at pressure points will occlude bleeding. The operator does not need to "judge" when enough pressure is applied and manually discontinue the blood flow. Unless stopped by the instructor, users should continue treatment until the bleeding is stopped through the use of proper technique, or the unit bleeds out.

One of the CRL's key features is its realistic bleeding system. This system simulates a packable hemostatic wound to the left inguinal crease area and an amputated right leg popliteal hemorrhage. The internal reservoir (bladder) that stores blood is made from heavy-duty polyurethane and holds approximately two (2) liters of liquid blood mix.

The pumping system simulates pressurized, pulsed blood flow, and will exhaust the reservoir supply (bleed-out) in approximately 2-4 minutes (depending on treatment to occlude or slow blood flow). Once the blood bladder is filled (see Filling/Refilling the CRL with Blood), users activate the blood pump from the command screen and touch controls on the transmitter. This will cause blood to flow in pulsing squirts from the bottom of the right leg amputation, and the hemostatic wound at the inguinal crease will quickly fill with blood. The amputation and inguinal wound bleeding can be set so they run at the same time, or one at a time.

Chapter 3

Chapter 3: Getting Started

Read all TraumaFX and Third Party user instructions and manuals before attempting to assemble, install or operate the CRL or accessories.

Notes on General Use and Care

The CRL is designed for rugged use in realistic training environments. To ensure proper operation, care for the CRL unit as you would a human patient by not subjecting your CRL unit to unnecessarily harsh treatment. Also, careful preventive maintenance and frequent after-use inspection is essential to ensure the service life of your unit(s). Please review **Chapter 5: After Use Care**, which outlines the after use care required under the terms of the CRL limited warranty.

Only use TraumaFX-provided TraumaFX® simulated blood and blood mixes in your CRL unit. Use of other liquids or the addition of any substance, including detergents, to the blood mix may damage internal components and will void the limited warranty.

Charging the Batteries

CRL & RC Transmitter Batteries

Read all instructions provided in the Operating Manual – Makita Battery Charger and associated Transmitter Battery documentation before using.

Each CRL unit utilizes three (3) 18v Makita Lithium-Ion batteries for operation. Three (3) Makita batteries are provided as standard equipment. Two batteries power the unit, and the third battery powers the RC transmitter. Additional batteries are available for purchase through TraumaFX by contacting your account representative or customer support.

Only use the batteries and charger(s) provided by TraumaFX; use of different equipment may result in damage to the batteries and/or TraumaFX equipment and can void the limited warranty. Read the instructions for the Makita battery and charger in the *Operating Manual – Makita Battery Charger* provided.

The CRL and RC Transmitter batteries are consumable items (with a one (1) year manufacturer's warranty). As with most batteries, Makita batteries have a finite shelf life. After considerable use, a 'used' battery's capacity will drop to a point that it will no longer be able to hold a charge.

The CRL contains a low voltage disconnect feature that will automatically shut the unit off when battery voltage drops to a certain level. If the CRL stops operating, remove and recharge batteries or replace with fully charged batteries.

Recharging the CRL and RC Transmitter Batteries

1. **Plug** the Makita quick charger (Figure 4) into a standard 110V wall outlet.
2. **Slide** the battery onto the quick charger until firmly in place and the indicator light illuminates (each battery takes approximately 30-45 minutes to charge, and depending on the amount of usage, provides up to 4 hours of training support).
3. **Remove** the battery when readout indicates charging is complete.

Figure 4

NOTE: A 220V Makita charger is available for International use. This is a special-order item and available for purchase through TraumaFX by contacting customer support or your account representative.

General Use and Care of Batteries

All batteries used in TraumaFX products were specially selected to provide optimal operational performance. However, as with all batteries, they will last longer with proper care and maintenance. To preserve the life of the batteries, the following best practices are recommended:

1. Only use the batteries and charger(s) provided by TraumaFX; use of different equipment may result in damage to the batteries and/or the TraumaFX unit(s).
2. Remove all batteries from the CRL or RC Transmitter at the end of each training session. Batteries should never be stored inside a unit (CRL or RC Transmitter)
3. Recharge batteries immediately after use by placing them in the Makita battery charger.

4. Fully recharge all batteries before each training exercise. This is indicated by a solid green light on the charger for each battery.
5. Never mix a fully charged battery with a partially charged battery as this will cause the TraumaFX unit to not operate properly.
6. Never mix an old battery with a new battery as this will quickly degrade the new battery.
7. Do not mix batteries of different capacities (Amp hours), as the lower capacity battery will exhaust first and may fail.
8. Store batteries indoors, away from extreme temperatures (not above 120°F or below 38°F).
9. Only charge TraumaFX-related batteries using the approved chargers supplied with the TraumaFX system.

Installing and Removing the Batteries

Installing the CRL Batteries

1. Select two (2) 100% fully charged Makita Lithium-Ion batteries.
2. **Open** the battery compartment door on the CRL unit by twisting the two (2) latches on the battery door (Figure 5) *counter-clockwise*.
3. **Insert** the two (2) fully charged batteries into the battery compartment (Figure 6).
4. **Push** each battery into the battery compartment until they audibly 'click' into place (Figure 6).
5. **Close** the battery compartment door and secure it by twisting the two (2) latches *clockwise* until tight (do not over tighten).

Figure 5

Figure 6

Removing the CRL Batteries

1. **Open** the battery compartment door on the CRL unit by twisting the two (2) latches on the battery door (Figure 5) *counter-clockwise*.

2. **Press** the white, push button (Figure 7) located on each of the batteries to remove them from the CRL unit.

Figure 7

Installing and Removing the Remote Control Transmitter Battery

1. **Install** the battery by inserting the battery into the back of the unit (Figure 8) by sliding the battery into the battery slot until it locks into place.

2. **Remove** the battery by pressing the white, push button located on the battery to remove the battery from the remote control transmitter.

Figure 8

Attaching an Optional TraumaFX® Upper Unit to the CRL

The CRL unit can attach to any TraumaFX® upper unit to help trainees learn how to treat patients suffering from multiple traumatic injuries.

Be sure to install fully charged batteries in the CRL before connecting the upper body unit – the connection will block access to the battery compartment. Both units have been designed to enable rapid battery replacement during training exercises.

Attaching to a TraumaFX Upper Unit

1. **Fold back** the upper unit chest fascia to expose the quick connect system (Figure 9).

2. **Bring the Lower and Upper units together** and line up one side of the Upper quick connect with the corresponding Lower unit quick connect (Figure 10).

3. **Insert** the cotter pins into the bracket holes (Figure 11) on both sides of the unit.

4. Pull down chest fascia to cover the space between the upper and lower units.

Figure 9

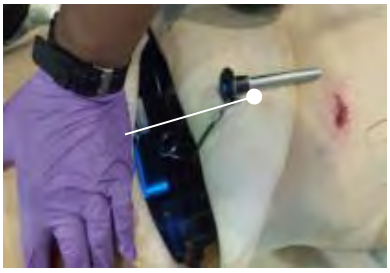

Figure 10

Figure 11

Using the CRL with a Live Actor

For enhanced realism in training scenarios, the CRL unit can be used with a live actor in lieu of the optional upper body unit. Several options exist, including the use of a modified cot (Figure 12), a false-bottom floor (Figure 13) or a hole dug in the earth (Figure 14).

Figure 12

If using a live actor, here are a few tips to enhance the simulation:

Tips:

1. **Use** the actor's shirt-tails, jacket, and some light padding to conceal the seam where the CRL and the actor come together.

2. **Anchor** the CRL unit with rope or straps to the surface structure or frame to prevent the CRL unit from moving away from the live actor during animatronic movement, and will allow the actor to reposition the CRL unit between training sessions.

3. If possible**, use a back support** for the actor.

Figure 13

Figure 14

Simulated Bleeding

Priming the Hose and Blood System

The CRL blood fill hose is sent to you "pre-primed" with water and should not require any additional priming when first received. Results are best when water is left in the hose between uses. If cavitations (air pockets) arise, the hose can be primed again using objects such as Allen keys or pencil erasers to push in the valve of the quick-connect attachment at each end of the hose. To re-prime the hose, attach one end of the blood fill hose to the quick-connect valve on the blood fill system. Then, using a sharp object, simply push in the valve at the other end of the hose. Let water flow through the hose until the air pocket is eliminated.

Prior to the first use or after a period of non-use, it is recommended to prime the blood system with water (temperature range of 40°F – 120°F) before filling it with artificial blood to ensure optimum pump action. This process removes the air that may be trapped during shipping and handling. This process can be repeated if you notice any decrease in pumping pressure after prolonged use.

1. Fill red blood bucket (with the quick connect fitting) with clean cold or warm water (temperature range of 40°F – 120°F)
2. Connect clear hose from bucket to lower unit via blood fitting, which can be exposed by gently pulling the skin back at the waist.

Figure 15

3. Elevate bucket to allow gravity to fill the blood reservoir in the lower unit. The reservoir holds one liter of blood liquid. Generally, this fill process takes between 1 and 3 minutes (the higher the fill bucket elevation, the shorter the fill time).
4. Disconnect the hose from the unit and keep the hose clear of any grit or debris that could impede or compromise the pump system.
5. Turn the RC transmitter ON (Figure 15).
6. Turn the CRL switch ON. The ON/OFF switch is located under the skin at the left side of the waist and can be reached by gently pulling the skin Back (Figure 16).

Figure 16

7. Verify the remote is paired with the CRL unit by pressing the ***Settings*** button (Figure 17) from the *Session Control* screen. Refer to the Remote Control User Guide if the unit is not paired.

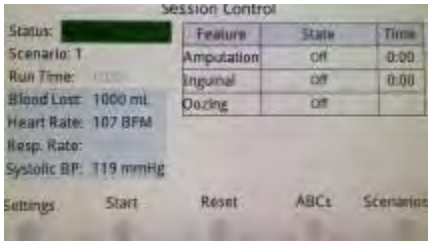

Figure 17

8. Press ***Maintenance*** (Figure 18**)** from the main menu

9. Press the ***Flush Lower Arterial*** (Figure 19) button to begin priming the system.

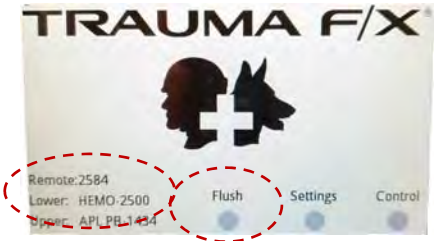

Figure 18

IMPORTANT: Ensure the CRL reservoir has sufficient fluid before turning on the blood pump.

10. Press the ***Flush Lower Arterial*** (Figure 19) button again to stop priming the system or when there is no more water coming out of the system.

11. Next, turn the CRL switch OFF, and then turn the transmitter OFF.

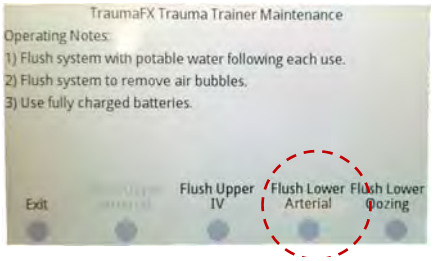

Figure 19

Mixing the TraumaFX® Blood Powder

The blood powder and mixed blood solutions may stain fabric and porous surfaces. Do not add any other substance to the blood (including detergents) as they may damage internal components and will void the limited warranty.

Use care when transporting pre-mixed blood or open bags of blood mix powder. If a surface or fabric comes into contact with the simulated blood solution, treat with detergent as soon as possible to avoid permanent stains. Simulated Blood should be washed out of clothing as soon as possible (preferably within 24 hours) to avoid staining. Pre-treatment of stains and vigorous cleaning will usually remove simulated bloodstains. Only use detergents and cleansers recommended by the manufacturer(s) of the affected surfaces or fabrics. If dry blood powder is spilled, avoid contact with liquids. Sweep or vacuum the affected area immediately.

To mix the blood powder, follow the instructions below:

1. **Remove** any items from inside the blood filling system, and check that bucket is clear of dirt or debris

2. **Fill** the blood fill container with the desired amount of water

3. **Open** the corresponding number of blood powder packets (1 packet per gallon) and empty the entire contents of each blood powder packet into the blood fill container

4. **Stir** the blood powder into the water until thoroughly mixed.

Filling/Refilling the CRL with Blood

If the CRL is completely empty, then it will likely take approximately 2 minutes to totally fill it.

1. **Connect** one end of the quick connect blood fill hose to the quick connect valve on the bottom of the bucket (Figure 20)

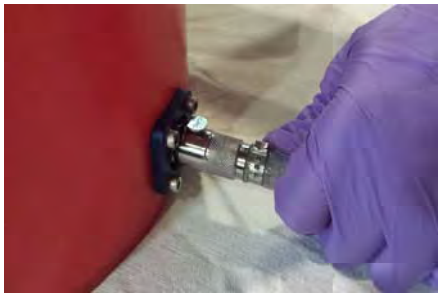

Figure 20

2. **Carefully** connect the fill hose from the fill bucket to the CRL unit blood fitting (Figure 21), which can be exposed by gently pulling the skin back on the right side of the waist. When connecting and disconnecting there may be a small amount (a couple of drops) of blood left over from the connecting action. This is normal. If there is a large amount visible or there is a constant drip when connected then the black rubber 'O-ring' on the fill connector on the CRL body should be removed and replaced with an O-ring (provided) as the old one is likely damaged.

Figure 21

3. **Raise** the filled blood bucket above the CRL so that gravity makes the blood flow into the CRL. The CRL is filled by gravity alone. The fill process works best if the bucket is positioned at least 3 feet above the CRL unit (Figure 22).

4. **Disconnect** the quick connect blood fill hose from the quick connect valve on the CRL.

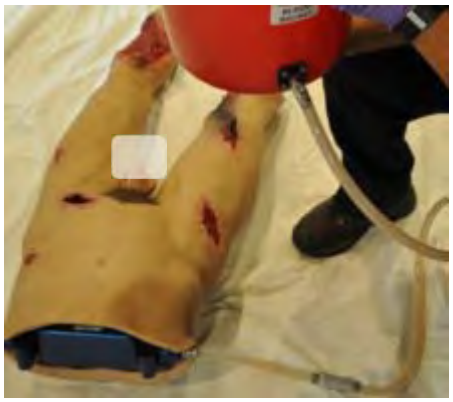

Figure 22

Filling/Refilling the CRL with Urine

The urine fill port is located on the left side of the CRL waist plate, and is labeled "URINE" on the site. Mix urine in a clear or white bucket using food-based dyes to achieve the desired color of urine. Use the large syringe and quick disconnect hose provided (Figure 23) to add urine to the system. Connect the male fitting to the attached quick disconnect fitting, place the tube in the urine solution and fill the syringe by drawing the plunger back. When the syringe is filled, remove the male quick disconnect fitting, and attach the female fitting on the end of the hose with the fill port on the CRL (Figure 24). Depress the plunger to fill the reservoir with urine.

Figure 23

The CRL urine bladder holds 250ml of fluid, so the fill procedure can be repeated. The reservoir is full when you feel added resistance to the syringe; do not overfill. Urine can be removed by following these steps in reverse.

Figure 24

Applying Blood Paste

Blood paste can be applied to enhance the realism of the CRL's wounds and various surfaces in staged training areas. The CRL unit comes with one (1) gallon of pre-mixed blood paste. Additional quantities can be purchased by contacting TraumaFX customer service or your account representative.

Blood paste provides the look of coagulated blood. The paste can be rubbed onto simulated wounds using a paint brush, sponge, or fingers to enhance their realistic appearance and feel, and can be used to provide the appearance of coagulated blood on floors, walls, doors, or other surfaces (see caution above regarding staining of surfaces with simulated blood compounds).

Chapter 4

Chapter 4: Operating the Clinical Response Lower (CRL)

This chapter describes the operational features of the CRL. In-depth instructions on how the CRL and Remote Control (RC) Transmitter work together are located in the ***TraumaFX® Remote Control Transmitter User Guide*** that accompanies the CRL.

Power

Power for the CRL's lower unit is provided by two (2) 18v Makita Lithium-Ion batteries. Power for the RC transmitter is provided by one (1) 18v Makita Lithium-Ion battery. All batteries are fully rechargeable and come with a charger and complete manufacturer's instructions and operating manuals.

Sync and Animatronics Check

Prior to beginning a training exercise with the CRL unit, performing a quick sync check between the RC transmitter and the CRL is highly recommended. Prior to shipment, each RC transmitter is synced and fully tested with its paired CRL unit and should not require any customer adjustment. Instructions on how to sync your unit to the RC Transmitter are located in the ***TraumaFX® Remote Control Transmitter User Guide*** that accompanies this unit.

To perform a quick sync check, perform the following:

1. **Power on the CRL transmitter** by pressing the power switch on the side of the RC transmitter.

2. **Power on the CRL** by pressing the push button located on the upper left side of the CRL unit. When the power is on the switch will light up brightly.

3. The Remote Control will initially present the **Main Splash Screen** (Figure 25). Units paired with the Remote Control appear in the lower left corner.

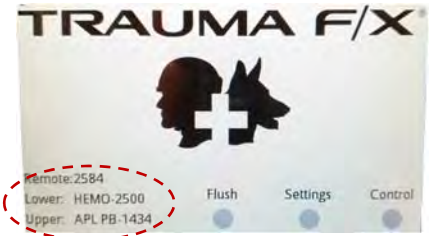

Figure 25

Once a successful link has been established, users can test the animatronic leg movements by moving the joystick on the RC Transmitter up and down, and back and forth. The legs should move accordingly.

Tourniquet Application and Pressure Points

The CRL is designed to simulate accurate and realistic bleeding for training simulation. A tourniquet applied properly will occlude bleeding even though the blood pump is activated. Blood flow can also be stopped by placing knee, elbow, or hand pressure to the side of the groin area or to points along the mid and upper thighs.

Intramuscular (IM) Injection Sites

The intramuscular (IM) injection sites are located bilaterally along the outside of the thighs. The skin plugs are self-sealing to prevent leaks and visual evidence of previous needle-sticks. Fluids can be administered to the sites, and liquids drain out the legs: the left side drains out the heel, while the right drains out the amputation site.

Powering Down

When powering down, press the lighted power button on the CRL. The light will turn off when the power is off. Turn off the power to the Remote Transmitter by pressing and holding the power button for approximately 3 seconds. The screen will turn off and the power LED will turn off.

Cleaning

Prior to turning off the CRL, the blood system should be drained of all simulated blood and flushed with potable water. ***This is best accomplished by leaving the blood pump on until the blood system is empty.*** The blood can also be manually drained back into the blood fill bucket using the gravity fill technique described below:

IMPORTANT: Make sure there is no water or simulated blood in the CRL blood system prior to storing the CRL unit.

To manually remove blood from inside the CRL unit:

Figure 26

1. **Connect** the quick connect blood fill hose to the quick connect valve on the upper right side of the CRL (Figure 26).

2. **Connect** the other end of the quick connect blood fill hose to the quick connect valve on the bottom of the bucket (Figure 27).

3. **Place the CRL** on a table or elevated surface such as a litter to raise the CRL above the level of the bucket.

Figure 27

Users should clean the blood system after each use (see Chapter 5) by filling the CRL with water via the gravity fill and letting the blood pump circulate the water through the blood system until it is clean (indicated by clear liquid pumping out from the CRL's wound sites). Once clean, the water can be removed from the CRL by placing the CRL on a table or elevated surface such as a litter to raise the CRL above the level of the bucket.

The urine reservoir should also be emptied after each use. To empty the reservoir, attach the urine fill syringe to the urine fill port on the CRL waist plate, and manually draw the fluid out of the system with the syringe. If more fluid remains, empty the syringe and repeat until no more fluid can be drawn.

To clean CRL's exterior features:

1. Gently **clean** the CRL after each use with water only (never use abrasive materials on CRL's skin).

2. If stains persist on the CRL's exterior, gently clean with a soft wet cloth or sponge. DO NOT vigorously scrub the CRL's skin or surface area as this can remove hair and skin coloring, and cause permanent abrasions.

3. Clothing that comes into contact with simulated blood can be cleaned using standard laundry techniques, but should be cleaned separately from other items to avoid discoloration. Simulated bloodstains should be pre-treated and washed out of clothes within 24 hours to avoid permanent staining.

Cleaning the Inlet Blood Filter

In the event that the unit will not fill or empty when connected to the blood bucket, it may be necessary to change the inlet filter. To change the filter:

Figure 28

1. Locate the filter wrench that was provided with the unit (Figure 28).
2. Unscrew the unit filter assembly located at the waist plate (Figure 29).
3. Remove the spring and the unit filter.
4. Clean the filter under running water, using a wire brush if necessary, to loosen debris.
5. Replace filter with the open end facing inward, and replace the spring.
6. Hand tighten the nut. Ensure the O-ring is in place. DO NOT OVERTIGHTEN.

Figure 29

Dragging

TraumaFX® systems are very rugged, but need to be treated as you would a live patient whenever possible. A common method for quickly dragging an injured patient to a safe location is to grab the flak jacket or tactical vest with one hand and drag head-first. When doing so, it is important to first properly attach the vest to the manikin torso to prevent damage to the head and neck area. When using a drag harness, it is best to keep the straps separate and to support the head with the straps to prevent neck damage.

Tips for Safely Dragging TraumaFX Systems:

- ✓ Ensure that the vest is properly attached to the manikin using all straps, and that the straps are fully tightened.
- ✓ Do not use a torn or damaged vest, as this may cause the vest to ride up under the neck.
- ✓ Test the fit of the vest before the exercise to make sure it is properly placed and sufficiently tight.
- ✓ To drag, grab the strap behind the neck – not in front
- ✓ Grab with one hand, as shown below, or with 2 hands – one on each strap behind the shoulders
- ✓ For harness drags, use both handles on either side of the head

- ✓ When possible, remove heavy helmets when dragging with an unsupported head. You can also replace with a lightweight plastic version.
- ✓ Never drag by pulling the head. Treat the manikin as you would a real patient.

Packing

Prior to storing the CRL in its storage case, always perform the following procedures:

1. **Move** the CRL's legs as close together as possible using the RC transmitter so that the unit will fit properly into the case
2. **Power down** the CRL
3. **Remove** the batteries from the CRL unit and recharge fully before storing
4. **Store** the batteries and their charger in their proper places provided in the CRL storage case
5. **Close** the CRL battery compartment securely prior to placement in its case
6. **Turn off** the RC Transmitter and **Remove** the battery from the RC transmitter, recharge fully, and place it in its proper place in the CRL storage case
7. **Place** the RC transmitter in its proper place in the CRL storage case
8. **Empty and rinse out** the blood fill bucket with water
9. **Place** the CRL unit in its proper place in the CRL storage case

Chapter 5

Chapter 5: After Use Care

To keep the CRL operating as designed, the following preventive maintenance actions must be completed after each training session.

These easy to perform maintenance actions will help ensure the CRL remains in peak operating condition for each training session:

1. **Flush the CRL's blood system with water** after each use and prior to storage lasting longer than one day.

2. **Empty the CRL's simulated blood bladder** after each use either by running the pump dry or by connecting the blood fill bucket to the lower unit and placing the bucket at a lower elevation than the unit. This will prevent damage to the bladder from exposure to extreme heat or cold.

3. **Remove batteries** daily after training is complete. Do not store batteries in the CRL unit or in the transmitter as this could cause the batteries to fail.

4. **Fully recharge the CRL batteries** after each training exercise. Also fully recharge the transmitter batteries prior to each training exercise. To extend the service life of the batteries, do not run the batteries until they are completely out of charge.

5. **Do not mix** a fully charged battery with a partially charged battery as this will cause the CRL unit to not operate properly.

6. **Do not mix a** new battery with an old battery as this will quickly degrade the new battery.

7. **Only use** approved chargers supplied with the CRL system to recharge the CRL and transmitter batteries.

8. **Wash skin and wounds with water** after each day of use. Blood paste is cellulose based and could attract insects if left on TraumaFX lower or upper training products.

9. **If the skin is cut**, then clean the cut with alcohol or with a silicone-approved cleaner that does not leave a residue. Allow the cut to thoroughly dry. Repair

the cut using a silicone adhesive such as Sil-Poxy© by Smooth-On. Allow all repairs to fully cure prior to use.

10. **Read the User's Manual** for the Battery Chargers and follow instructions and precautions listed inside the manual.

Chapter 6

Chapter 6: Troubleshooting & Repair

Contact TraumaFX Technical Support at: MATTsupport@traumafx.net, or 1-800-200-7465 if trouble-shooting steps do not resolve an issue you are experiencing.

Issue	Actions
Both simulated bleeding and movements are not working	**Check batteries:** ▪ Charge the CRL batteries ▪ Charge the RC transmitter battery ▪ Ensure all batteries are fully seated or locked into position. ▪ Check to see if switch LED is on **RC Transmitter:** ▪ Check LCD display on front to verify that it is functioning and paired with the CRL ▪ Check battery charge, replace if low
Animatronic movements are not working	**Check batteries:** ▪ Charge both of the CRL batteries ▪ Charge the RC transmitter battery ▪ Ensure all batteries are fully seated or locked into place **Clutches:** ▪ If the CRL does not move in one or more directions, then move the joystick on the RC transmitter through the whole range of motion. This should reseat the clutches inside CRL's legs if they were disengaged.
Blood not flowing out of CRL unit	**Check batteries:** ▪ Make sure the CRL and RC Transmitter power is turned on ▪ Charge CRL batteries

Issue	Actions
	▪ Charge RC transmitter battery ▪ Ensure all batteries are fully seated or locked into place **Fill the CRL with blood:** ▪ Verify blood bladder is full by connecting gravity fill bucket to CRL and topping off reservoir ▪ Test bleeding
CRL does not fill with simulated blood	**Faulty quick connectors** ▪ Test each quick connector by pressing in the valve on the connector to see if air and fluid can pass through **Clogged filters** ▪ Filter in bucket or waist plate might be clogged with debris ▪ If so, remove, clean and reinstall or replace filter **Unable to fill with blood** ▪ If cavitations (air pockets) arise, the hose can be primed again using objects such as Allen keys or pencil erasers to push in the valve of the quick-connect attachment at each end of the hose **Full blood reservoir** ▪ Bleed for 30 seconds and attempt to refill
Skin appears damaged	▪ Clean cut with water first and then rubbing alcohol and allow to dry ▪ Apply Sil-Poxy to cut (close with tape or medical bandage if necessary to hold together until glue cures); allow glue to cure 1-8 hours
The wound display is flashing between success and no success without treatment being applied to the system	▪ Use the system flush feature to clear the unit of air bubbles or old blood.
	▪ Check to see if the CRL unit is turned on.

Issue	Actions
RC transmitter is not working	▪ Is the LCD displaying information (located on the front panel)? ▪ Is the RC Transmitter showing "Paired" with the CRL unit ▪ Ensure all batteries in the CRL unit and RC transmitter are fully charged.

Additional Support

For other troubleshooting issues not identified above, please contact TraumaFX Technical Support at MATTSupport@traumafx.net or 1-800-200-7465.

How to Repair the CRL Skin

The CRL skin is very rugged, but just like human skin, it is not impervious to accidental damage from cuts or tears from sharp objects or physical abuse. Regular maintenance will ensure its longevity. The CRL skin is made of a silicone compound that can be easily repaired using a silicone adhesive specifically made for repairing silicone cuts and tears.

1. Thoroughly clean cut or tear with water followed by rubbing alcohol.
2. Thoroughly dry the skin surface.
3. Generously spread the Sil-Poxy inside of, and over, the cut or tear (Figure 31 and Figure 32).
4. For a cut, pinch the cut back together.
5. For a tear, replace the skin flap. Apply tape/medical bandage if necessary to hold together until the Sil-Poxy cures.
6. Gently and immediately wipe off excess Sil-Poxy. Do not let sit.
7. Allow the Sil-Poxy to cure at least 8 hours before skin is used. Once cured, the repaired cut or tear should be difficult to see.

Figure 30

Figure 31

Figure 32

O-Ring Procedures and Replacement

To prevent leaking, small, black rubber O ring seals have been added to both quick connect valves (Figure 33) - on the CRL as well as on the blood filling bucket. Replacement O-rings are provided and may need to be replaced due to wear or loss from time to time.

Maintaining O-Rings

The O-rings will last longer if the connection with the fill hose is made carefully, approaching the connector on the body straight on with the thumb holding down the 'quick connect' lever on the connector in hand.

Figure 33

When to Replace an O-Rings

The O-ring on each quick connect valve should be inspected at the beginning and end of each training cycle for each individual CRL unit. ***ANY*** nick or cut in the O-ring requires immediate replacement.

When connecting and disconnecting, a small amount (a couple of drops) of blood left over from the connecting action is normal, but if a large amount is visible, or if there is a constant drip after the quick connect hose is connected, then the O-ring should be removed and replaced with a new one.

NOTE: Additional O-rings can be obtained at most major hardware or home improvement stores – reference #011 O-ring (Aerospace Standards), 5/16" internal diameter, for ¼" coupler.

Appendix A

Appendix A – CRL Technical Specs

CRL Lower Unit

Weight: 81 lbs. (empty)
Power Supply: Two (2) 18V (3.0-5.0AHr) Li-ion batteries
Bleed-out time (with full reservoir and no resistance): 3 minutes
CAUTION: Tubing contains latex
Indoor or Outdoor Use
Altitude Rating: Altitude up to 2000 m
Temperature Rating: Temperatures between 32°F and 104°F (0°C to 40°C)
Humidity Rating: Maximum relative humidity 80% for temperatures up to 88°F (31°C) decreasing linearly to 50% relative humidity at 104°F (40°C)

Makita DC18RC Battery Charger

Input: A.C. 120 V 50 – 60 HZ
Output: D.C. 7.2 V – 18 V
Weight: 1.0 kg (2.2 lbs)

Remote Control Transmitter

Effective Range: Outdoor range is 200 meters (line of site); indoor range is 50 meters but is subject to building construction materials that may impede signal.
Power supply: 18v Lithium Ion Battery
Transmit power: 63mW (18dBm)
RF Data Rate: 250,000 bps
FCC ID: Contains FCC ID: OUR-XBEEPRO**

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

FCC Approval: Systems that include XBee/XBee-PRO Modules inherit MaxStream's Certifications. FCC ID: OUR-XBEEPRO

ISM (Industrial, Scientific & Medical): 2.4 GHz frequency band
Manufactured under ISO 9001:2000 registered standards XBee/XBee-PRO RF Modules are optimized for use in US, Canada, Australia, Israel, and Europe (contact MaxStream for complete list of approvals).

IMPORTANT: The XBee/XBee-PRO OEM RF Module has been certified by the FCC for use with other products without any further certification (as per FCC section 2.1091). Modifications not expressly approved by MaxStream could void the user's authority to operate the equipment.

Appendix B – Safety Data Sheets

- **Blood Paste**
- **Blood Powder**
- **Lithium-Ion Batteries**

Blood Paste SDS

SAFETY DATA SHEET

"BLOOD" PASTE

blair adhesives

www.blairadhesives.com

SECTION 1: IDENTIFICATION

PRODUCT NAME: "BLOOD" PASTE
MANUFACTURER NAME: BLAIR ADHESIVE PRODUCTS, INC
11034 LOCKPORT PLACE
SANTA FE SPRINGS, CA 90670
562-946-6004
EMERGENCY PHONE: CHEMTREC 1-800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

SKIN CONTACT: PROLONGED OR REPEATED CONTACT MAY CAUSE SLIGHT SKIN IRRITATION IN PEOPLE PRONE TO ALLERGIC REACTIONS.

EYE CONTACT: DIRECT CONTACT WITH MATERIAL MAY CAUSE IRRITATION.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS#	%
METHYL CELULOSE	9004-65-3	TRADE SECRET
WATER	7732-18-5	TRADE SECRET
PROPRIETARY FOOD COLORS	8028-89-5	TRADE SECRET
SODIUM BENZOATE	532-32-1	TRADE SECRET

SECTION 4: FIRST AID MEASURES

SKIN CONTACT: WASH AFFECTED SKIN AREAS THOROUGHLY WITH SOAP & WATER.

EYE CONTACT: FLUSH EYES WITH LARGE QUANTITIES OF WATER UNTIL IRRITATION CEASES.

SECTION 5: FIRE FIGHTING MEASURES:

EXTINGUISHING AGENTS: NO SPECIAL REQUIREMENTS FOR THIS PRODUCT; USE FOAM, CARBON DIOXIDE, OR DRY CHEMICAL FIRE-FIGHTING APPARATUS APPROPRIATE FOR SURROUNDING FIRE.

UNUSUAL HAZARDS: NONE.

PERSONAL PROTECTIVE EQUIPMENT: NONE REQUIRED.

SECTION 6: ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: NONE REQUIRED

EMERGENCY PROCEDURES: SPILLAGE MAY BE CLEANED WITH WATER. USE CAUTION, PRODUCT IS SLIPPERY. DO NOT WASH INTO STORM SEWER OR OPEN WATERWAY.

CONTAINMENT: NONE REQUIRED

DISPOSAL: DISPOSE OF USED PRODUCT IN ACCORDANCE WITH APPLICABLE LOCAL, COUNTY, STATE AND FEDERAL REGULATIONS.

SECTION 7: HANDLING AND STORAGE

HANDLING PROCEDURES: USE CAUTION, AS PRODUCT IS SLIPPERY.

SAFETY DATA SHEET

STORAGE CONDITIONS: KEEP PRODUCT AS CLEAN AS POSSIBLE TO AVOID POSSIBLE PRODUCT CONTAMINATION. STORE IN CLOSED CONTAINERS AT 80* - 90* F. AVOID EXTREME VARIATIONS OF TEMPERATURE AND HUMIDITY.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

	OSHA PEL		ACGIH	
	ppm	mg/M	ppm	mg/M
CHEMICAL NAME				
METHYL CELLULOSE	NONE LISTED		NONE LISTED	
WATER	NONE LISTED		NONE LISTED	
PROPRIETARY FOOD COLORS	NONE LISTED		NONE LISTED	
SODIUM BENZOATE	NONE LISTED		NONE LISTED	

ENGINEERING CONTROLS: MECHANICAL GENERAL ROOM VENTILATION.

RESPIRATORY PROTECTION: NO RESPIRATORY PROTECTION IS EXPECTED TO BE NEEDED IN NORMAL USE.

EYE PROTECTION: GENERALLY NOT NECESSARY. PERSONAL PREFERENCE.

HAND PROTECTION: GENERALLY NOT NECESSARY. PERSONAL PREFERENCE.

OTHER PROTECTIVE EQUIPMENT: NONE REQUIRED.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	SMOOTH THICK RED LIQUID
ODOR	NONE
MELTING POINT	NOT APPLICABLE
BOILING POINT	212* F WATER
FLASH POINT	NOT APPLICABLE
EVAPORATION RATE	NOT APPLICABLE
FLAMMABILITY	NOT APPLICABLE
UPPER EXPLOSIVE LIMIT	NOT APPLICABLE
LOWER EXPLOSIVE LIMIT	NOT APPLICABLE
VAPOR PRESSURE	NOT APPLICABLE
VAPOR DENSITY	NOT APPLICABLE
SPECIFIC GRAVITY	1.2 - 1.4 (WATER =1)
SOLUBILITY IN WATER	COLLOIDAL SUSPENSION
AUTO IGNITION TEMP.	NOT APPLICABLE

SECTION 10: STABILITY AND REACTIVITY

REACTIVITY: NONE KNOWN.

CHEMICAL STABILITY: THIS MATERIAL IS CONSIDERED STABLE.

SECTION 11: TOXICOLOGICAL INFORMATION

NO TOXICITY DATA ARE AVAILABLE FOR THIS MATERIAL.

SECTION 12: ECOLOGICAL INFORMATION

NO APPLICABLE DATA.

SECTION 13: DISPOSAL CONSIDERATIONS

PROCEDURE :
DISPOSE OF USED PRODUCT IN ACCORDANCE WITH APPLICABLE LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SAFETY DATA SHEET

CONTAINERS :
'EMPTY' CONTAINERS SHOULD NOT BE GIVEN TO INDIVIDUALS, BUT BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

US DOT HAZARD CLASS ------ NOT REGULATED

SECTION 16: REGULATORY INFORMATION

WORKPLACE CLASSIFICATION: THIS PRODUCT, **AS SUPPLIED**, IS NON HAZARDOUS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29CFR 1910.1200).

THIS PRODUCT IS NOT A 'CONTROLLED PRODUCT' UNDER THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS).

EMERGENCY PLANNING & COMMUNITY RIGHT TO KNOW:

SARA TITLE III.: SECTION 311/312 CATEGORIZATIONS (40CFR 370)
THIS PRODUCT IS NOT A HAZARDOUS CHEMICAL UNDER 29CFR 1910.1200, AND THEREFORE IS NOT COVERED BY TITLE III. OF SARA.

SARA TITLE III.: SECTION 313 INFORMATION (40CFR 372)
THIS PRODUCT DOES NOT CONTAIN A CHEMICAL WHICH IS LISTED IN SECTION 313 AT OR ABOVE 'de minimis' CONCENTRATIONS.

CERCLA INFORMATION (40CFR 302.4): RELEASES OF THIS MATERIAL TO AIR, LAND, OR WATER ARE NOT REPORTABLE TO THE NATIONAL RESPONSE CENTER UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) OR TO STATE AND LOCAL EMERGENCY PLANNING COMMITTEES UNDER THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III. SECTION 304.

RCRA INFORMATION & WASTE CLASSIFICATION: WHEN A DECISION IS MADE TO DISCARD THIS MATERIAL, **AS SUPPLIED**, IT DOES NOT MEET RCRA'S CHARACTERISTIC DEFINITION OF IGNITABILITY, CORROSIVITY, OR REACTIVITY, AND IS NOT LISTED IN 40CFR 261.33.

THE TOXICITY CHARACTERISTIC (TC), HOWEVER, HAS NOT BEEN EVALUATED BY THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP).

UNITED STATES: CHEMICAL CONTROL LAW STATUS: ALL COMPONENTS OF THIS PRODUCT ARE IN COMPLIANCE WITH THE INVENTORY LISTING REQUIREMENTS OF THE U.S. TOXIC SUBSTANCES CONTROL ACT (TSCA) CHEMICAL SUBSTANCE INVENTORY.

CALIFORNIA PROPOSITION 65: THIS PRODUCT DOES NOT CONTAIN A COMPONENT OR COMPONENTS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

NFPA HAZARD RATING :		**SCALE :**
TOXICITY	1	4=EXTREME
FIRE	0	3=HIGH
REACTIVITY	0	2=MODERATE
SPECIAL	-	1=SLIGHT
		0=INSIGNIFICANT

Blood Powder

SDS Name: Blood Red Dye Blend

DyStar

Safety Data Sheet (SDS)
North American
Revision date:5/1/2015

SECTION 1: Identification

Product identifiers:

Product trade name:	Blood Red Dye Blend
Company product number:	26DA6787
Other means of identification:	Not Available

Recommended use of the chemical and restrictions on use:

Uses:	Cosmetics
Restrictions on use:	None identified

Details of the supplier:

Manufacturer/Supplier:	DyStar LP 9844-A Southern Pine Blvd Charlotte, NC, 28207 USA
Emergency telephone number:	Chemtrec (24 hours): USA: 1-800-424-9300; International: +001-703-527-3887.

SECTION 2: Hazard(s) identification

Information in accordance with 29 CFR 1910.1200 (Hazcom 2012) in effect on May 25, 2012:

Classification of the chemical in accordance with 29 CFR 1910.1200(d):

Combustible Dust (OSHA Defined)

Label elements in accordance with 29 CFR 1910.1200(f):

Hazard pictogram(s): Not Applicable

Signal word:
Warning

Hazard statements:
USH001 May form combustible dust concentrations in air.

Precautionary statements: Not Applicable

Supplemental information: Dermal contact may discolor the skin due to dye characteristics.

Notes: No Additional Information

Hazards not otherwise classified: No Additional Information

See Section 11 for toxicological information.

SECTION 3: Composition/information on ingredients

Mixture:

No Hazardous Components found under applicable regulations.

Amounts specified are typical and do not represent a specification. Remaining components are proprietary, non-hazardous, and/or present at amounts below reportable limits. Exact percentage values for components are proprietary in accordance with 29 CFR 1910.1200(i).

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SECTION 4: First-aid measures

Description of first aid measures:

General: If irritation or other symptoms occur or persist from any route of exposure, remove the affected individual from the area: see a physician/get medical attention.

Eye contact: Any material that contacts the eye should be washed out immediately with water. Get medical attention if symptoms occur.

Skin contact: Wash the affected area thoroughly with plenty of soap and water. Get medical attention if symptoms occur.

Inhalation: If affected, remove to fresh air. Get medical attention if symptoms occur.

Ingestion: Get medical attention if symptoms occur.

Protection of first aid responders: Wear proper personal protective clothing and equipment.

Most important symptoms and effects, both acute and delayed: Irritation, Skin discoloration due to dye. Preexisting sensitization, skin and/or respiratory disorders or diseases may be aggravated. See section 11 for additional information.

Indication of any immediate medical attention and special treatment needed, if necessary: Treat symptomatically.

SECTION 5: Fire-fighting measures

NFPA flammability class: N/A (Combustible solid)

Extinguishing media:

Suitable: Carbon dioxide, foam, dry chemical, water.

Unsuitable: Avoid hose streams or any method which will create dust clouds.

Special hazards arising from the chemical:

Unusual fire/explosion hazards: Concentrated dust/air combinations may produce explosive conditions. As with all organic dusts, fine particles suspended in air in critical proportions and in the presence of an ignition source may ignite and/or explode. Dust may be sensitive to ignition by electrostatic discharge, electrical arcs, sparks, welding torches, cigarettes, open flame, or other significant heat sources. As a precaution, implement standard safety measures for handling finely divided organic powders. See Section 7 for suggested measures.

Hazardous combustion products: Irritating or toxic substances may be emitted upon burning, combustion or decomposition. See section 10 (10.6 Hazardous decomposition products) for additional information.

Special protective equipment and precautions for fire-fighters: Avoid hose streams or any method which will create dust clouds. Wear self-contained breathing apparatus (SCBA) equipped with a full facepiece and operated in a pressure-demand mode (or other positive pressure mode) and approved protective clothing. Personnel without suitable respiratory protection must leave the area to prevent significant exposure to hazardous gases from combustion, burning or decomposition. In an enclosed or poorly ventilated area, wear SCBA during cleanup immediately after a fire as well as during the attack phase of firefighting operations.

See section 9 for additional information.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures: See Section 8 for recommendations on the use of personal protective equipment. If spilled in an enclosed area, ventilate. Avoid raising powdered material due to explosion hazard. Use spark-proof and explosion-proof equipment. If inhalation of dust cannot be avoided, wear an approved particulate respirator.

Environmental precautions: Do not flush product into public sewer, water systems or surface waters.

Methods and materials for containment and cleaning up: Contain spill. Wear proper personal protective clothing and equipment. Using care to avoid dust generation, vacuum or sweep into a closed container for reuse or disposal. Use approved industrial vacuum cleaner for removal. Avoid causing dust. Place into labeled, closed container; store in safe location to await disposal. Change contaminated clothing and launder before reuse.

SECTION 7: Handling and storage

Precautions for safe handling: As with any chemical product, use good laboratory/workplace procedures. Wash thoroughly after handling this product. Always wash up before eating, smoking or using the facilities. Use under well-ventilated conditions. Avoid eye contact. Avoid repeated or prolonged skin contact. Avoid drinking, tasting, swallowing or ingesting this product. Avoid routine inhalation of dust of any kind. Exercise care when emptying containers, sweeping, mixing or doing other tasks which can create dust. Wash contaminated clothing before reuse. Provide eyewash fountains and safety showers in the work area. As a precaution to control dust explosion potential, implement the following safety measures:Eliminate ignition sources (e.g., sparks, static buildup, excessive heat, etc.). In general, dust of organic materials is a static charge generator which may be ignited by electrostatic discharge, electrical arcs, sparks, welding torches, cigarettes, open flame, or other significant heat sources. Use spark-proof tools and equipment. Bond, ground and properly vent conveyors, dust control devices and other transfer equipment. Prohibit flow of polymer, powder or dust through non-conductive ducts, vacuum hoses or pipes, etc.; only use grounded, electrically conductive transfer lines when pneumatically conveying product. Good housekeeping and controlling of dusts are necessary for safe handling of product. Prevent accumulation of dust (e.g., well-ventilated conditions, promptly vacuuming spills, cleaning overhead horizontal surfaces, etc.). A properly engineered explosion suppression system must be considered. See standards such as the National Fire Protection Association NFPA 654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids"; NFPA 69, "Standard on Explosion Prevention Systems"; NFPA 68, "Standard on Explosion Protection by Deflagration Venting"; NFPA 77, "Recommended Practice on Static Electricity" and other standards as the need exists.

Conditions for safe storage, including any compatibilities: Store cool and dry, under well-ventilated conditions. Store this material away from incompatible substances (see section 10). Do not store in open, unlabeled or mislabeled containers. Keep container closed when not in use.

SECTION 8: Exposure controls / personal protection

Control parameters:

Occupational exposure limits (OEL): No applicable exposure limits.

Exposure controls:

Appropriate engineering controls: Always provide effective general and, when necessary, local exhaust ventilation to draw dust away from workers to prevent routine inhalation. Ventilation must be adequate to maintain the ambient workplace atmosphere below the exposure limit(s) outlined in the SDS. Eliminate ignition sources (e.g., sparks, static buildup, excessive heat, etc.). Prohibit flow of powder or dust through non-conductive ducts, vacuum hoses, or pipes, etc. Bond, ground, and properly vent conveyors, dust control devices and other transfer equipment. (Ventilation guidelines/techniques may be found in publications such as Industrial Ventilation: American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Cincinnati, OH, 45240-1634, USA.) (http://www.acgih.org/home.htm).

Individual protection measures, such as personal protective equipment (PPE):

Eye/face protection: Wear eye protection.

Skin and body protection: Wear protective gloves. Use good laboratory/workplace procedures including personal protective clothing: labcoat, safety glasses and protective gloves.

Respiratory protection: Respiratory protection is not needed with proper ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. If inhalation of dust cannot be avoided, wear an approved particulate respirator. Use respirator in accordance with manufacturer's use limitations and OSHA standard 1910.134 (29CFR).

Further information: Eyewash fountains and safety showers are recommended in the work area.

SECTION 9: Physical and chemical properties

Form:	Powder	**pH:**	Not Available
Appearance:	Brown, Orange	**Relative density:**	Not Available
Odor:	None	**Partition coefficient (n-octanol/water):**	Not Available

SDS Name: Blood Red Dye Blend

Odor threshold:	Not Available	**% Volatile by weight:**	Not Available
Solubility in water:	Soluble	**VOC:**	Not Applicable
Evaporation rate:	Not Available	**Boiling point °C:**	Not Applicable
Vapor pressure:	Not Available	**Boiling point °F:**	Not Applicable
Vapor density:	Not Available	**Flash point:**	Not Applicable
Viscosity:	Not Available	**Auto-ignition temperature:**	Not Available
Melting point/Freezing point:	Not Available	**Flammability (solid, gas):**	Not flammable (may form combustible dust-air mixtures)
Oxidizing properties:	Not oxidizing	**Flammability or explosive limits:**	**LFL/LEL** Not Available
Explosive properties:	Not explosive		**UFL/UEL** Not Available
Decomposition temperature:	Not Available		

Other information: Amounts specified are typical and do not represent a specification.

Dust combustibility data: YELLOW DYE COMPONENT: Particle size variation is considered a critical factor in regards to dust explosion hazard information. Results applicable as follows: sample particle size <75 um, <5% moisture content. Sample tested may not be typical of product.:

- Minimum explosive concentration: 100 g/m3
- Minimum Autoignition temperature (dust cloud): 570 °C
- Minimum Autoignition temperature (dust layer): 325 °C
- Maximum pressure of explosion: 7.9 bars-gauge
- Deflagration Index, Kst: 109 bar-m/sec
- Dust Hazard Class: 1 (weak)

SECTION 10: Stability and reactivity

Reactivity: None known.

Chemical stability: This product is stable.

Possibility of hazardous reactions: Hazardous polymerization will not occur.

Conditions to avoid: Avoid dust formation.

Incompatible materials: Avoid strong bases and oxidizing agents.

Hazardous decomposition products: Carbon dioxide, carbon monoxide, oxides of nitrogen, and oxides of sulfur.

SECTION 11: Toxicological information

Information on likely routes of exposure:

General: Caution must be exercised through the prudent use of protective equipment and handling procedures to minimize exposure.

Eyes: Solid particles on the eye (powder/dust) may cause pain and be accompanied by irritation.

Skin: Repeated or prolonged skin contact may cause irritation. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.

Inhalation: Dust inhalation may cause respiratory irritation.

Ingestion: Ingestion may cause irritation.

Symptoms/effects, acute and delayed: Irritation, Skin discoloration due to dye

Acute toxicity information: Not classified (based on available data, the classification criteria are not met). No toxicity studies have been conducted on this product. ATEmix (oral): >2000 mg/kg.

Skin corrosion/irritation: Not classified.

Serious eye damage/irritation: Not classified.

Respiratory or skin sensitization: Not classified.

Carcinogenicity: Not classified.

Carcinogenic status: The components of this mixture are not known to be listed or regulated by IARC, NTP, OSHA or ACGIH.

Germ cell mutagenicity: Not classified.

Reproductive toxicity: Not classified.

Specific target organ toxicity (STOT) - single exposure: Not classified.

Specific target organ toxicity (STOT) - repeated exposure: Not classified.

Aspiration hazard: Not classified (technical impossibility to obtain the data).

Other toxicity information: No additional information available.

SECTION 12: Ecological information

Ecotoxicity: No ecological testing has been conducted on this product.

Persistence and degradability: No specific information available.

Bioaccumulative potential: No specific information available.

Mobility in soil: No specific information available.

Other adverse effects: No additional information available.

SECTION 13: Disposal considerations

Although this product is not defined or designated as hazardous by current provisions of the Federal (EPA) Resource Conservation and Recovery Act (RCRA, 40CFR261), recognize that in appropriate dust/air ratio, dust cloud in air may have explosion potential. Incinerate or landfill waste in a properly permitted facility in accordance with federal, state and local regulations.

See Section 8 for recommendations on the use of personal protective equipment.

SECTION 14: Transport information

The information below is provided to assist in documentation. It may supplement the information on the package. The package in your possession may carry a different version of the label depending on the date of manufacture. Depending on inner packaging quantities and packaging instructions, it may be subject to specific regulatory exceptions.

UN number: N/A

UN proper shipping name:

Not regulated - See Bill of Lading for Details

Transport hazard class(es):

U.S. DOT hazard class: N/A
Canada TDG hazard class: N/A
Europe ADR/RID hazard class: N/A
IMDG Code (ocean) hazard class: N/A
ICAO/IATA (air) hazard class: N/A

A "N/A" listing for the hazard class indicates the product is not regulated for transport by that regulation.

Packing group: N/A

Environmental hazards:

Marine pollutant: Not Applicable

Hazardous substance (USA): Not Applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code: Not Applicable

Special precautions for user: Not Applicable

SECTION 15: Regulatory information

Safety, health and environment regulations/legislation specific for the product:

U.S. federal and state regulations/legislation:

This SDS has been prepared in accordance with the hazard criteria of the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

U.S. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Reportable Quantity (RQ):

Not Applicable

U.S. Superfund Amendments and Reauthorization Act (SARA) - SARA Section 313:

None Known

California Proposition 65:

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:
None known to be present or none in reportable amounts for occupational exposure as per OSHA's approval of the California Hazard Communication Standard, Federal Register, page 31159 ff, 6 June 1997.

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards:
None known to be present or none in reportable amounts for occupational exposure as per OSHA's approval of the California Hazard Communication Standard, Federal Register, page 31159 ff, 6 June 1997.

Canada regulations/legislation:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Canadian Workplace Hazardous Material Information System (WHMIS) classification: Not controlled

Canadian Ingredient Disclosure List:

None known to be present or none in reportable amounts

Mexico regulations/legislation:

This SDS contains the information required by NOM-018-STPS-2000 Workplace Hazardous Chemical Substances Communication and Identification Standard.

Chemical inventories:

Regulation	Status
Canadian Domestic Substances List (DSL):	Y
Canadian Non-Domestic Substances List (NDSL):	N
U.S. Toxic Substances Control Act (TSCA):	Y

A "Y" listing indicates all intentionally added components are either listed or are otherwise compliant with the regulation. A "N" listing indicates that for one or more components: 1) there is no listing on the public inventory; 2) no information is available; or 3) the component has not been reviewed.

SECTION 16: Other information

SDS Revision date: 5/1/2015

HMIS (Hazardous Materials Identification System) Ratings:

Health: 1 **Flammability:** 1 **Reactivity (Stability):** 0 **Personal Protection:** X

NFPA (National Fire Protection Association) Ratings:

Health: 1 **Flammability:** 1 **Instability:** 0

Key: 0=Insignificant; 1=Slight; 2=Moderate; 3=High; 4=Extreme. An asterisk appearing after the HMIS Health numerical rating denotes a chronic hazard.

Hazardous Materials Identification System (HMIS), National Paint and Coating Association, rating applies to product "as packaged" (i.e., ambient temperature). Ratings are based upon HMIS® III and NFPA 704 (2007). An asterisk appearing after the HMIS Health® III numerical rating

denotes a chronic hazard. National Fire Protection Association (NFPA) rating identifies the severity of hazards of material during a fire emergency (i.e., "on fire").

Legend:

ACGIH: American Conference of Governmental Industrial Hygienists
N/A: Not Applicable
N/E: None Established
STEL: Short Term Exposure Limit
TWA: Time Weighted Average (exposure for 8-hour workday)

Users Responsibility/Disclaimer of Liability:
As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this product. Information contained herein is believed to be true and accurate but all statements or suggestions are made without warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof. Compliance with all applicable federal, state, and local laws and local regulations remains the responsibility of the user.

This bulletin cannot cover all possible situations which the user may experience during processing. Each aspect of your operation should be examined to determine if, or where, additional precautions may be necessary. All health and safety information contained in this bulletin should be provided to your employees or customers. It is your responsibility to develop appropriate work practice guidelines and employee instructional programs for your operation.

Safety Data Sheet Preparer:
Product Compliance Department
Emerald Performance Materials, LLC
2020 Front Street, Suite 100
Cuyahoga Falls, Ohio 44221
United States

Lithium Battery SDS

SECTION 1. CHEMICIAL PRODUCT AND COMPANY NAME

Lithium-Ion Rechargeable Battery Pack
BL1815N & BL1850
Symbol (S) at the bottom of the battery

Safety Data Sheet

Complies with the OSHA Hazard Communication Standard 29 CFR 1910.1200

Makita U.S.A., Inc. 14930-C Northam Street La Mirada, CA 90638	Prepared By: Stan Rodrigues Date Revised: 2/11/2015

EMERGENCY CONTACT INFORMATION

Telephone Number for Information: MAKITA: 1-510-657-9881

Emergency Response

For Chemical Emergency
Spills, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night
Within USA and Canada 1-800-424-9300

SECTION 2. HAZARD IDENTIFICATION:

Route(s) of Entry:	There is no hazard when the measures for handling and storage are followed.
Signs and Symptoms of Exposure:	In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
OSHA Hazard Communication:	This material is not considered hazardous by the OSHA Hazard Communication Standard 29CFR 1910.1200.
Carcinogenicity (NTP):	Not listed
Carcinogenicity (IARC):	Not listed
Carcinogenicity (OSHA):	Not listed
Special hazards for human health and environment:	There is no hazard when the measures for handling and storage are followed. In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

SECTION 3. COMPOSITION, INFORMATION OR INGREDIENTS

CAS-No.	Chemical Name	Quantity
1307-96-6	Cobalt oxide	< 30 %
1313-13-9	Manganese dioxide	< 30 %
1313-99-1	Nickel oxide	< 30 %
7440-44-0	Carbon	< 30 %
	Electrolyte (*)	< 20 %
24937-79-9	Polyvinylidene fluoride (PVdF)	< 10 %
7429-90-5	Aluminum foil	2 - 10 %
7440-50-8	Copper foil	2 - 10 %
	Aluminum and inert materials	5 - 10 %
Full text of each relevant R phrase can be found in Section 16		

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CONTINUED: SECTION 3. COMPOSITION, INFORMATION OR INGREDIENTS

For information purposes:	(*) Main ingredients: Lithium hexafluorophosphate, organic carbonates
Because of the cell structure the dangerous ingredients will not be available if used properly. During charge process a lithium graphite intercalation phase is formed.	
Mercury content:	Hg < 0.1mg/kg
Cadmium content:	Cd < 1mg/kg
Lead content:	Pb< 10mg/kg
Wh rating:	Under 100Wh
Anode (negative electrode):	Based on intercalation graphite
Cathode (positive electrode):	Based on lithiated metal oxide (Cobalt, Nickel, Manganese)

SECTION 4. FIRST AID MEASURE

General information:	The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing. Undamaged, closed cells do not represent a danger to the health.
After inhalation:	Ensure of fresh air. Consult a physician.
After contact with skin:	In case of contact with skin wash off immediately with plenty of water. Consult a physician.
After contact with eyes:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical treatment by eye specialist
After ingestion:	Drink plenty of water. Call a physician immediately.

SECTION 5. FIRE FIGHTING MEASURES

Suitable extinguishing media:	Cold water and dry powder in large amount are applicable. Use metal fire extinction powder or dry sand if only few cells are involved.
Special hazards arising from the chemical:	May form hydrofluoric acid if electrolyte comes into contact with water. In case of fire, the formation of the following flue gases cannot be excluded: Hydrogen fluoride (HF), Carbon monoxide and carbon dioxide.
Protective equipment and precautions for firefighters:	Wear self-contained breathing apparatus and protective suit.
Additional information:	If possible, remove cell (s) from firefighting area. If heated above 125°C, cell (s) can explode/vent. Cell is not flammable but internal organic material will burn if the cell is incinerated.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions:	Use personal protective clothing. Avoid contact with skin, eyes and clothing. Avoid breathing fume and gas.
Environmental precautions:	Do not discharge into the drains/surface waters/groundwater. Methods for cleaning up/taking up Take up mechanically and send for disposal.

SECTION 7. HANDLING AND STORAGE

Handling	
Advice on safe handling:	Avoid short circuiting the cell. Avoid mechanical damage of the cell. Do not open or disassemble. Advice on protection against fire and explosion Keep away from open flames, hot surfaces and sources of ignition.
Storage	
Requirements for storage rooms and vessels:	Storage at room temperature (approx. 20°C) at approx. 20- 60% of the nominal capacity (OCV approx. 3.6 - 3.9 V/cell). Keep in closed original container.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ingredient	Risk Codes	Safety Description	Hazard	Exposure Controls/Personal Protection
Cobalt oxide	R22, R43, R50/53	S24; S37; S60; S61	Xn (Harmful)N (Dangerous for the environment)	0.1 mg/m3 (TWA)
Manganese (VI) oxide	R20/22	S25	Xn (Harmful)	**Airborne Exposure Limits:** - OSHA Permissible Exposure Limit (PEL): 5 mg/m3 Ceiling for manganese compounds as Mn - ACGIH Threshold Limit Value (TLV): 0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn
Nickel oxide	R43, R49, R53	S45, S53, S61	T(Toxic)	**Airborne Exposure Limits:** For Nickel, Metal and Insoluble Compounds, as Ni: - OSHA Permissible Exposure Limits (PEL) - 1 mg/m3 (TWA). For Nickel, Elemental / Metal: - ACGIH Threshold Limit Value (TLV) - 1.5 mg/m3 (TWA), A5 - Not suspected as a human carcinogen. For Nickel, Insoluble Compounds, as Ni: - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m3 (TWA), A1 - Confirmed human carcinogen
Carbon	R36/37/38 R36/37 R20, R10	S22; S24/25	F(Highly Flammable) Xn (Harmful) Xi (Irritant)	**Airborne Exposure Limits:** - OSHA Permissible Exposure Limits (PELs): activated carbon (graphite, synthetic). Total particulate = 15 mg/m3
Aluminum foil	R17, R15, R36/38, R10, R67, R65, R62, R51/53, R48/20, R38, R11,	S7/8, S43, S26, S62 S61, S36/37, S33, S29, S16, S9	F (Highly Flammable) Xn (Harmful) Xi (Irritant)	**Airborne Exposure Limits:** -OSHA Permissible Exposure Limit (PEL): 15 mg/m3 (TWA) total dust and 5 g/m3 (TWA) repairable fraction for Aluminum metal as Al -ACGIH Threshold Limit Value (TLV): 10 mg/m3 (TWA) Aluminum metal dusts

CONTINUED: SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ingredient	Risk Codes	Safety Description	Hazard	Exposure Controls/Personal Protection
Copper foil	R11 R36 R37 R38	S5, S26, S16, S61, S36/37	F (Highly Flammable) N(Dangerous for the environment) Xn (Harmful) Xi (Irritant)	Copper Dust and Mists, as Cu: - OSHA Permissible Exposure Limit (PEL) - 1 mg/m3 (TWA) - ACGIH Threshold Limit Value (TLV) - 1 mg/m3 (TWA) Copper Fume: - OSHA Permissible Exposure Limit (PEL) - 0.1 mg/m3 (TWA) - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m3 (TWA)
Polyvinylidene fluoride (PVdF)		S22;S24/25		

Additional advice on limit values:	During normal charging and discharging there is no release of product.
Occupational exposure controls:	No specific precautions necessary.
Protective and hygiene measures:	When using do not eat, drink or smoke. Wash hands before breaks and after work.
Respiratory protection:	No specific precautions necessary.
Hand protection:	No specific precautions necessary.
Eye protection:	No specific precautions necessary.
Skin protection:	No specific precautions necessary.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Form:	Solid
Color:	Various
Odor:	Odourless
Important health, safety and environmental information	
Test method	
pHValue:	n.a.
Flash point:	n.a.
Lower explosion limits:	n.a.
Vapour pressure:	n.a.
Density:	n.a.
Water solubility:	Insoluble
Ignition temperature:	n.a.

SECTION 10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions to avoid:	Keep away from open flames, hot surfaces and sources of ignition. Do not puncture, crush or incinerate.
Materials to avoid:	No materials to be especially mentioned.
Hazardous decomposition products:	In case of open cells, there is the possibility of hydrofluoric acid and carbon monoxide release.
Possibility of Hazardous Reactions:	Will not occur
Additional information:	No decomposition if stored and applied as directed.

SECTION 11. TOXICOLOGICAL INFORMATION

Empirical data on effects on humans:	If appropriately handled and if in accordance with the general hygienic rules, no damages to health have become known.

SECTION 12. ECOLOGICAL INFORMATION

Further information:	Ecological injuries are not known or expected under normal use. Do not flush into surface water or sanitary sewer system.

SECTION 13. DISPOSAL CONSIDERATIONS

Advice on disposal:	For recycling consult manufacturer.
Contaminated packaging:	Disposal in accordance with local regulations.

SECTION 14. TRANSPORT INFORMATION

- When a number of batteries are transported by ship, vehicle and railroad avoid high temperature and dew condensation.
- Avoid transportation which may cause damage of package.
- Lithium-ion batteries are not subject to dangerous goods regulation for the purpose of transportation by the International Maritime Dangerous Goods regulations (IMDG). For Lithium-ion batteries, the Watt-hour rating is no more than 20Wh /cell and 100Wh/ battery pack can be treated as "non-dangerous goods" by the United Nations Recommendations on the Transport of Dangerous Goods/Special Provision 188, provided that the products are prevented from being short-circuited with each other and are packaged in an appropriate condition which satisfies Packing Group II performance level.
- IATA (International Air Transport Association): Dangerous Goods Regulation
  Packing Instruction 965 (Lithium-ion or lithium polymer cells and batteries without electronic equipment)
- US Hazardous Materials Regulations 49 CFR (Code of Federal Regulations) Sections 173-185 Lithium batteries and cells.

Section II requirements apply to lithium-ion cells with a Watt-hour rating not exceeding 20 Wh and lithium-ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that within the allowance permitted in Section II, Table 965-11.

TABLE 965-II

Contents	Lithium-ion cells and/or batteries with a Watt-hour rating of 2.7 Wh or less	Lithium-ion cells with a Watt-hour rating of more than 2.7Wh but not more than 20Wh	Lithium-ion batteries with a Watt-hour rating of more than 2.7Wh but not more than 100Wh
Maximum number of cells / batteries per package	No limit	8 cells	2 Batteries

CONTINUED: SECTION 14. TRANSPORT INFORMATION:

Contents	Lithium-ion cells and/or batteries with a Watt-hour rating of 2.7 Wh or less	Lithium-ion cells with a Watt-hour rating of more than 2.7Wh but not more than 20Wh	Lithium-ion batteries with a Watt-hour rating of more than 2.7Wh but not more than 100Wh
Maximum net quantity per package	2.5 kg	N/A	N/A

Lithium-ion cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- Each cell and battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;
  - cells and batteries must be manufactured under a quality management program;
  - for batteries, The Watt-hour rating must be marked on the outside of the battery case;
  - Each package must be capable of withstanding a 1.2m drop test in any orientation without:
    - damage to cells or batteries contained therein;
    - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
    - release of contents.
- Each package must be labeled with a lithium battery handling label.

Section IB requirements apply to lithium-ion cells with a Watt-hour rating not exceeding 20 Wh and lithium-ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium-ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of Regulation.

Even classified as lithium batteries packed with equipment (UN3481), lATA Dangerous Goods Regulations packing instruction 966 is applied.

Even classified as lithium batteries installed in equipment (UN3481), lATA Dangerous Goods Regulations packing instruction 967 is applied.

SECTION 15. REGULATORY INFORMATION

U.S. Regulations

National Inventory TSCA:	All of the components are listed on the TSCA inventory.
SARA:	To the best of our knowledge this product contains no toxic chemicals subject to the supplier notification requirements of Section 313 of the Superfund Amendments and Reauthorization Act (SARA/EPCRA) and the requirements of 40 CFR Part 372.

SECTION 16. OTHER INFORMATION

Hazardous Materials Information Label (HMIS)

Health:	0
Flammability:	0
Physical Hazard:	0

NFPA Hazard Ratings

Health:	0
Flammability:	0
Reactivity:	0
Unique Hazard:	

Full text of R-phrases referred to under Sections 2 and 3

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CONTINUED: SECTION 16. OTHER INFORMATION

R10	Flammable.
R20/22	Harmful by inhalation and if swallowed.
R22	Harmful if swallowed.
R34	Causes burns.
R40	Limited evidence of a carcinogenic effect.
R43	May cause sensitization by skin contact.
R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R49	May cause cancer by inhalation.
R50	Very toxic to aquatic organisms.
R53	May cause long-term adverse effects in the aquatic environment

Further Information

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product (s) and is based on the present level of our knowledge. This data does not constitute a guarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"

The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.