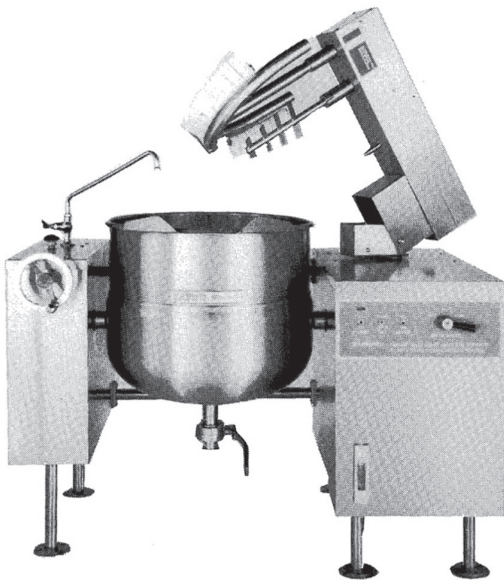




IMPORTANT FOR FUTURE REFERENCE	
Please complete this information and retain this manual for the life of the equipment:	
Model #:	_____
Serial #:	_____
Date Purchased:	_____

Installation & Operation Manual

Direct Steam Single & Twin Mixer Kettles KDMTL-40, KDMTL-60, KDMTL-80, KDMTL-100, KDMTL-40-2, KDMTL-60-2, KDMTL-80-2 & KDMTL-100-2



Model KDMTL-40



Model KDMTL-40-2

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

SOUTHBEND STEAM

 **MIDDLEBY** A Middleby Company

1100 Old Honeycutt Road Fuquay-Varina, North Carolina 27526 USA

www.southbendnc.com

SAFETY PRECAUTIONS

Before installing and operating this equipment, be sure everyone involved in its operation is fully trained and aware of precautions. Accidents and problems can be caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or to the equipment.



This symbol warns of immediate hazards that will result in severe injury or death.



This symbol refers to a potential hazard or unsafe practice that could result in injury or death.



This symbol refers to a potential hazard or unsafe practice that could result in injury, product damage, or property damage.

NOTICE

This symbol refers to information that needs special attention or must be fully understood, even though not dangerous.

IMPORTANT NOTES FOR INSTALLATION AND OPERATION



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



FOR YOUR SAFETY:

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.



Improper installation, operation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing, operating or servicing this equipment.

NOTICE

This product is intended for commercial use only. NOT FOR HOUSEHOLD USE.

NOTICE

This manual should be retained for future reference.

NOTICE

Adequate clearances MUST be maintained for servicing and proper operation.

NOTICE

Contact the factory, the factory representative or a local service company to perform maintenance and repairs should the appliance malfunction. Refer to warranty terms.

RETAIN THIS MANUAL FOR FUTURE REFERENCE.

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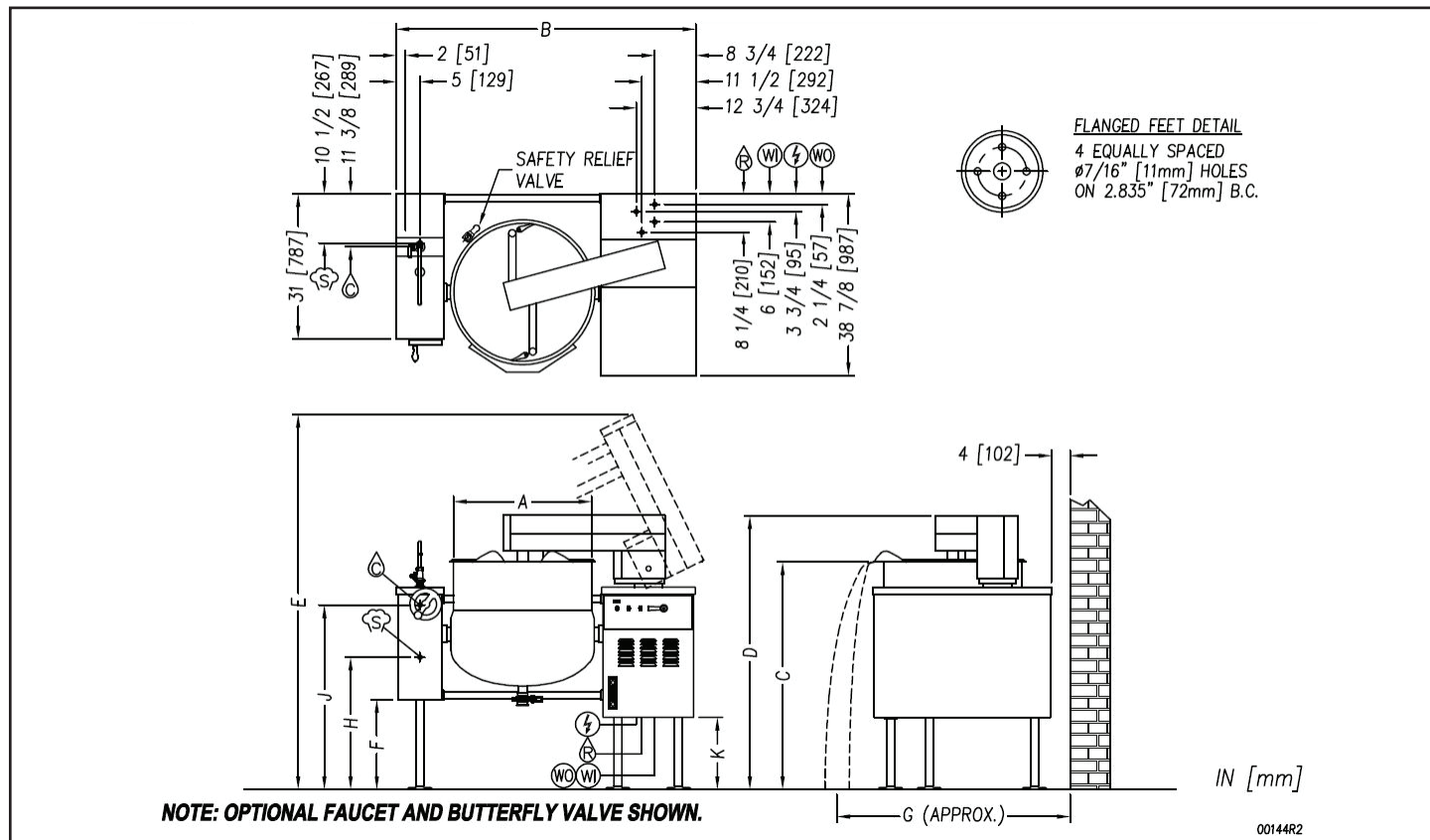
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SERVICE CONNECTIONS



SERVICE CONNECTIONS

- ⚡ – ELECTRICAL CONNECTION: to be as specified on data plate.
- ⊞ – STEAM SUPPLY: 3/4" IPS. 5-30 PSI (34-207 kPa) optional 5-45 PSI (34-310 kPa).
- 💧 – COLD or HOT WATER: 3/8" O.D. tubing to faucet. (OPTIONAL)
- Ⓡ – CONDENSATE RETURN: 1/2" IPS.
- Ⓜ – OIL COOLER WATER IN: 3/8" tube bulkhead union.
- Ⓜ – OIL COOLER WATER OUT: 3/8" tube bulkhead union.

DIMENSIONS

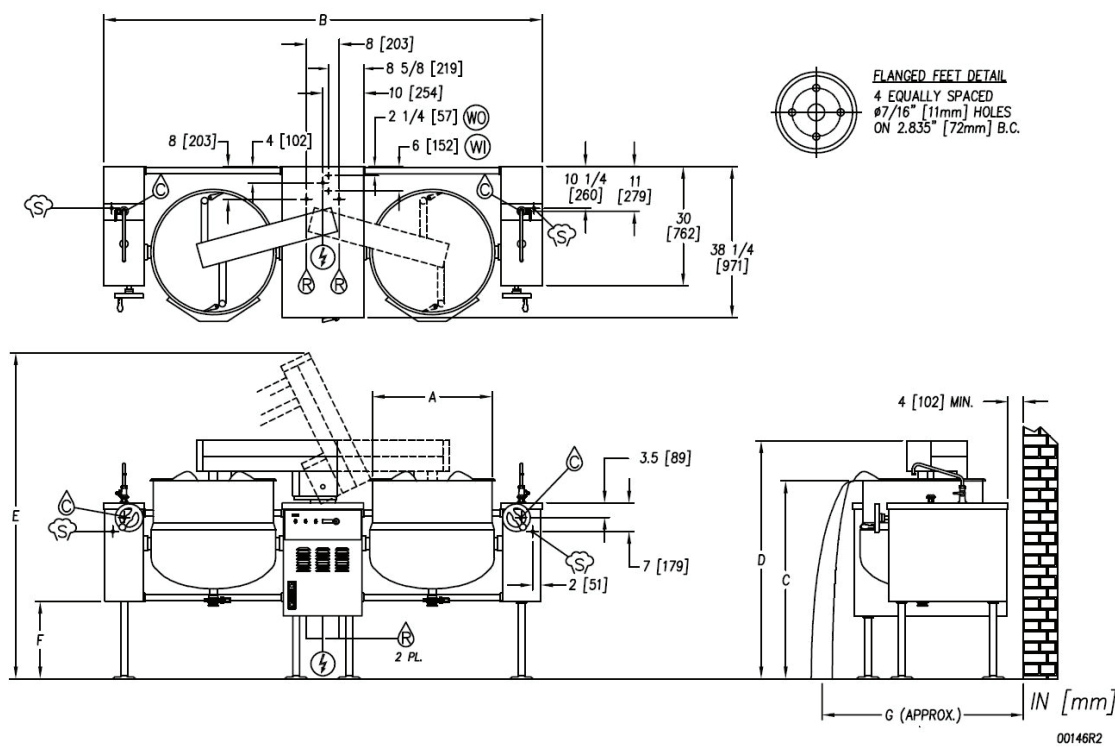
MODEL	CAPACITY	UNITS	A	B	C	D	E	F	G	H	J	K
KDMTL-40	40 Gallons (152 liters)	inches (mm)	26" (660)	62" (1575)	43.25" (1099)	55" (1397)	75.63" (1921)	14.75" (375)	56" (1422)	23.75 (603)	35 (889)	11 (279)
KDMTL-60	60 Gallons (227 liters)	inches (mm)	29.5" (749)	65" (1651)	49" (1245)	58.5" (1486)	80" (2032)	19" (483)	58" (1473)	28.13 (714)	39.38 (1000)	15.38 (391)
KDMTL-80	80 Gallons (303 liters)	inches (mm)	33" (838)	67.75" (1721)	49" (1245)	58.5" (1486)	80" (2032)	19" (483)	60" (1524)	28.13 (714)	39.38 (1000)	15.38 (391)
KDMTL-100	100 Gallons (380 liters)	inches (mm)	35.5" (902)	70" (1778)	49" (1245)	58.5" (1486)	85" (2159)	19" (483)	63" (1600)	28.13 (714)	39.38 (1000)	15.38 (391)

ELECTRICAL CHARACTERISTICS AND SPECIFICATIONS

MODEL	AMPS PER LINE			SHIPPING WEIGHT	MINIMUM CLEARANCE	
	208V	240V	480V			
KDMTL-40	14.0	14.0	7.0	700 lbs. [318 kg]	SIDES BACK	0 4" [102]
KDMTL-60				730 lbs. [331 kg]		
KDMTL-80				840 lbs. [381 kg]		
KDMTL-100				900 lbs. [410 kg]		

As continued product improvement is a policy of Crown, specifications are subject to change without notice.

DIRECT STEAM SINGLE AND TWIN MIXER KETTLES



SERVICE CONNECTIONS

- ⚡ – ELECTRICAL CONNECTION: to be as specified on data plate.
- ⊞ – STEAM SUPPLY: 3/4" IPS. 5-30 PSI (34-207 kPa) optional 5-45 PSI (34-310 kPa).
- ⊕ – COLD or HOT WATER: 3/8" O.D. tubing to faucet. (OPTIONAL)
- ⊖ – CONDENSATE RETURN: 1/2" IPS.
- ⊕ – OIL COOLER WATER IN: 3/8" tube bulkhead union.
- ⊖ – OIL COOLER WATER OUT: 3/8" tube bulkhead union.

DIMENSIONS

MODEL	CAPACITY	UNITS	A	B	C	D	E	F	G
KDMTL-40-2	40 Gal Each (151 liters)	inches (mm)	26" (660)	102" (2591)	43.25" (1099)	55" (1397)	75.63" (1921)	15.13" (384)	56" (1422)
KDMTL-60-2	60 Gal Each (227 liters)	inches (mm)	29.5" (749)	108" (2743)	49" (1245)	58.5" (1486)	80" (2032)	19.5" (495)	58" (1473)
KDMTL-80-2	80 Gal Each (303 liters)	inches (mm)	33" (838)	116" (2946)	49" (1245)	58.5" (1486)	80" (2032)	19.5" (495)	60" (1524)
KDMTL-100-2	100 Gal Each (380 liters)	inches (mm)	35.5" (902)	121" (3073)	49" (1245)	58.5" (1486)	85" (2159)	19.5" (495)	63" (1600)

ELECTRICAL CHARACTERISTICS AND SPECIFICATIONS

MODEL	AMPS PER LINE			SHIPPING WEIGHT	MINIMUM CLEARANCE	
	208V	240V	480V			
KDMTL-40-2	14.0	14.0	7.0	1360 lbs. [617 kg]	SIDES BACK	0 4" [102]
KDMTL-60-2				1440 lbs. [654 kg]		
KDMTL-80-2				1490 lbs. [676 kg]		
KDMTL-100-2				1615 lbs. [735 kg]		

As continued product improvement is a policy of Crown, specifications are subject to change without notice.

INTRODUCTION

DESCRIPTION

All Crown direct connected steam jacketed kettles pertaining to this manual are direct steam operated pressure vessels of a double-wall stainless steel construction forming a steam chamber (jacket) enveloping the lower two thirds of the kettle bowl surface. All kettles are tilting, floor mounted in fixed positions on legs with adjustable flanged feet. All kettles are equipped with a safety relief valve and a steam control valve.

CAPACITIES

All models are suffixed with either -40, -60, -80 or -100 to indicate the capacity of that kettle in US gallons. Thus a KDMTL-40 is a two thirds jacketed direct steam kettle mounted on legs with a capacity of 40 gallons (US).

FUNCTIONING MODE

Crown direct connected steam jacketed kettles consist of a stainless steel bowl and a stainless steel jacket which envelopes two thirds of the lower surface of the bowl thus forming a sealed pressure vessel (chamber) into which steam is introduced by means of a manual control valve.

The kettle bowl is the container for the food product which ideally should be of a liquid or semi-liquid consistency to achieve complete contact with the bowl surface and thus fully absorb the heat transmitted through that surface.

The temperatures required for the cooking process to function adequately must be greater than the boiling point of the liquid food product. Further, the greater the steam pressure used, the higher the temperature and consequently the quicker the cooking process. For example, steam pressurized at 30 psi attains a temperature of 274 degrees Fahrenheit (135 Celsius).

In the initial stages of the cooking process when the steam comes in contact with the cold kettle bowl surface it condenses and forms considerable amounts of water. A thermostatic steam trap should be plumbed to the exit end of the kettle jacket. This trap is a mechanical device that closes on high temperatures and opens when the temperature drops thus allowing the water formed from condensate to exhaust but retain steam under pressure. for tilting the kettles(s). Once the bridge has been lifted the agitators cannot be operated as a safety switch is activated. Bridge may now be moved out of the way or if a twin mixer, moved to the other kettle. The speed control is located on the front panel and may be set to the desired speed by turning. The maximum speed will not exceed 54 RPM on the smallest kettle and 40 RPM on the largest.

INSTALLATION

UNPACKING

IMMEDIATELY INSPECT FOR SHIPPING DAMAGE

Immediately after unpacking, check for possible shipping damage. If the kettle is found to be damaged, save the packaging material and contact the carrier within 15 days of delivery.

Before installing, verify that the electrical service agrees with the specifications on the rating plate located on the right side of the tilt console. If the supply and equipment requirements do not agree, contact your dealer or Crown Food Service Equipment Ltd.

INSTALLATION INSTRUCTIONS

The kettle must be installed in accordance with State and/or local codes. In the USA, the National Electrical code, ANSI/NFPA-70 (latest edition). In Canada, the Canadian Electrical Code, Part 1, CSA Standard C22.1 (latest edition).

1. Select a location to provide drainage for kettle pour path when tilted and for butterfly valve if so equipped. Allow sufficient rear clearance from wall for access to rear service panel on hydraulic console.
2. Level unit. Mark anchoring hole locations through flanged adjustable feet.
3. Remove unit and drill holes as marked and, insert expansion shields to accommodate 5/16" size lag bolts.
4. Reposition unit. Re-check level.
5. Bolt down unit and seal bolts with Silastic or equivalent sealing compound. Sealant must be applied not only to bolt heads but also around flanges making contact with the floor surface to fulfil NSF requirements. Wipe off excess sealant immediately.
6. Connect steam line (3/4" pipe size) to the steam inlet. Make sure there is a steam control valve strainer convenient to the unit. If incoming steam pressure is greater than kettle maximum operating pressure, then a pressure reducing valve must be installed in the line. If large amounts of water accumulate in the steam line it will be necessary to install one or more ball float traps in the line to eliminate the water. A steam line pressure gauge is also recommended to determine the actual amount of steam coming to the kettle.
7. Connect the condensate return line to a drain or to the boiler return line. Return line must have a check valve.
8. Connect cold water supply line as indicated in bottom of hydraulic console.
9. A control box with a power supply equivalent to the electrical rating of the unit should be located nearby. A waterproof electrical connection for the power supply to the unit must be provided.
10. Connect power supply as indicated.
11. Relief valves on the kettles must not be adjusted or closed off as they are set to relieve excess pressure in the kettles.
12. Do not make any adjustments to the hydraulic valves as they have all been adjusted at the factory.
13. Turn unit on when electrically connected, and check for proper operation.

OPERATION

WARNING

The kettle and its parts are hot. Use care when operating, cleaning and servicing the kettle.

OPERATING INSTRUCTIONS

KETTLE OPERATION

1. If kettle has a butterfly valve close it.
2. Fill kettle with product to desired level.
3. Slowly turn the steam control valve ON to full open position (counterclockwise).
4. The water or food should boil 3 to 4 minutes per gallon. If it does not then incoming pressure should be checked to determine that it is adequate to operate the kettle efficiently.
5. Regulate steam control valve depending on type of food being prepared.
6. When food is cooked, turn off steam, remove food and clean kettle immediately to prevent residue from drying on kettle bowl surface.

OPERATION OF MIXER UNIT

Power to operate the mixer unit is controlled by the “Main Power” switch located on the left side of the control panel. Place switch in the “ON” position. Ensure that mixer “speed” control is set to the “stop” position. Set the mixer switch, located beside the main power switch, to “ON” position. Note that the agitators should not be turning. The speed control has four basic settings which are: stop, slow, medium and fast. Set the speed control to the slow position and observe that the agitators turn.

WARNING

Never place hands inside kettle when agitators are in motion.

Increasing the speed setting on the control will increase the speed at which the agitators turn.

NOTICE

Always start agitators at the slow speed and then gradually increase to the desired speed to avoid splashing or “throwing” the product over edge of kettle.

RAISE MIXER BRIDGE

To tilt kettle for emptying or to clean agitators, the mixer bridge will tilt hydraulically upward and manually swing clear of the kettle. To do this, first turn speed control to “STOP” and then turn mixer switch to “OFF.”

NOTICE

Mixer agitator arms must be stopped at 90 degrees to the mixer bridge before raising the bridge. If the agitator arms do not stop in this position when speed selector is set to stop, then “jog” the selector on and off to achieve this position.

Push and hold the “TILT” switch in the “RAISE” position. Bridge will raise to maximum height. Bridge will stop at any position if the tilt switch is released and will remain in that position until switch is pushed to either raise or lower. When the bridge is fully raised it can be manually turned to the side to clear kettle.

NOTICE

The bridge is equipped with a safety switch which prevents turning of the agitators, regardless of the mixer switch, or speed control settings. Agitators will not engage unless the bridge is lowered so that the guide pin rests fully in the guide pin bracket on the side of the kettle.

REMOVAL OF AGITATORS

For ease of cleaning, the agitators are removable without tools. To remove, raise bridge as described above and swing clear of kettle. Grasp shaft of large agitator, push up and turn to disengage lock pin. Pull straight down on agitator. Remove the small agitator in the same manner. Soak and wash agitators in warm, soapy water. Never use abrasive cleansers or scouring pads on the stainless steel surfaces as this will damage the finish of the stainless steel.

If it is necessary to remove the scraper blades from the large agitator for cleaning purposes, do so by removing the pin at the end of the mounting shaft and then slide the scraper blades off of the shaft.

To clean the exterior stainless steel panels of your unit, use a damp soft cloth or soft cloth and stainless steel cleaner. Never use abrasive cleansers or scouring pads on the stainless steel surfaces as this will damage the finish of the stainless steel.

CLEANING

 WARNING

Disconnect the power supply to the appliance before cleaning or servicing.

 WARNING

Never spray water into electric controls or components!

 WARNING

The equipment and its parts are hot. Use care when operating, cleaning and servicing the appliance.

 CAUTION

Do not use cleaning agents that are corrosive.

Your kettle should be cleaned immediately after each use or when cooking a different product. Before cleaning, check that the kettle has cooled enough to touch it.

1. Ensure that power supply is OFF.
2. Pre-rinse inside of kettle thoroughly and drain to remove any food particles.
3. Using a nylon brush, clean kettle with a mild detergent and warm water rinse. **Never** use steel wool or scouring powder as it will scratch stainless steel.
4. Tilt kettle fully or open the tangent draw-off valve if one is provided to allow soap and water solution to drain. Rinse with clean water.
5. Wipe the exterior of kettle with a clean, damp cloth.

Use of cleaning agents that contain chloride, acids or salts are corrosive and may cause pitting and corrosion when used over a period of time; this will reduce the life of the appliance.

Should pitting or corrosion occur, this is not covered by warranty.

Use a mild detergent, warm water and rinse thoroughly.

WHAT TO DO IF SURFACE RUST APPEARS

Metal utensils should never be used as they will scratch the surface of the equipment and rust may begin to form. To remove surface accumulation of rust from the inadvertent use of such utensils, the following procedure may be used.

CAUTION

Improper use of this procedure may damage your appliance!

1. Use undiluted white vinegar with a non-abrasive scouring pad (plastic) or cloth on the affected area to remove the rust stain. The appliance should not be heated and remain at room temperature during the entire cleaning process.
2. If the stain resists removal, additional exposure time with vinegar may be required, to a maximum of one hour.
3. Thoroughly wash all of the vinegar away with fresh clear water. Dry the surface completely and allow one hour before using the appliance to cook.

Following daily and period maintenance procedures will prolong the life of your equipment. Climatic conditions - salt air - may require more thorough and frequent cleaning or the life of the equipment could be adversely affected.

STAINLESS STEEL

To remove normal dirt, grease or product residue from stainless steel, use ordinary soap and water (with or without detergent) applied with a sponge or cloth. Dry thoroughly with a clean cloth. Never use vinegar or any other corrosive cleaner.

To remove grease and food splatters or condensed vapors that have baked on the equipment, apply cleanser to a damp cloth or sponge and rub cleanser on the metal in the direction of the polishing lines. Rubbing cleanser as gently as possible in the direction of the polished lines will not mar the finish of the stainless steel. **NEVER RUB WITH A CIRCULAR MOTION.**

Soil and burn deposits which do not respond to the above procedure can usually be removed by rubbing the surface with **SCOTCH-BRITE™** scouring pads or **STAINLESS** scouring pads. **DO NOT USE ORDINARY STEEL WOOL** as any particles left on the surface will rust and further spoil the appearance of the finish. **NEVER USE A WIRE BRUSH, STEEL SCOURING PADS (EXCEPT STAINLESS), SCRAPER, FILE OR OTHER STEEL TOOLS.** Surfaces which are marred collect dirt more rapidly and become more difficult to clean. Marring also increases the possibility of corrosive attack. Refinishing may then be required.

TO REMOVE HEAT TINT: Darkened areas sometimes appear on stainless steel surfaces where the area has been subjected to excessive heat. These darkened areas are caused by thickening of the protective surface of the stainless steel and is not harmful. Heat tint can normally be removed by the foregoing, but tint which does not respond to this procedure calls for a vigorous scouring in the direction of the polish lines using **SCOTCH-BRITE™** scouring pads or a **STAINLESS** scouring pad in combination with a powdered cleanser. Heat tint action may be lessened by not applying or by reducing heat to equipment during slack periods.

All food contact surfaces must be thoroughly drained and flushed prior to cooking in the kettle.

CONTROL PANEL: The textured control panel should be cleaned with warm water and mild soap. Never use an abrasive cloth or steel wool. Never use cleaning solvents with a hydrocarbon base.

MAINTENANCE

GENERAL MAINTENANCE

NOTICE

Contact the factory, the factory representative or local service company to perform maintenance and repairs.

SAFETY VALVE MAINTENANCE AND TESTING

CAUTION

Under normal operating conditions a “try lever test” should be performed every two months. Under severe service conditions, or if corrosion and/or deposits are noticed within the valve body, testing must be performed more often. A “try lever test” should also be performed at the end of any non-service period.

CAUTION

Hot, high pressure fluid may be discharged from body drain and vent during “try lever” test. Care must be taken to avoid any bodily contact.

CAUTION

High sound levels may be experienced during “try lever” test. Wear proper safety equipment and exercise extreme care! Test at, or near, half of the operating pressure by holding the test lever fully open for at least two seconds to flush the valve seat free of sediment and debris. Then release lever and permit the valve to snap shut.

If lift lever does not activate, or there is no evidence of discharge, turn off equipment immediately and contact a licensed contractor or qualified service personnel.

Trunnion block bearings, fitted with a grease nipple should be filled with grease every couple of months or more frequently if so required. They are located in each console box and support the kettle for ease of tilting. The segment gear and worm should be greased at the same time if required. These are located in the tilt console box. No other general maintenance is required other than adhering to the Cleaning Procedure instructions.

BUTTERFLY VALVE

WARNING

If you are cleaning a valve that is assembled to a kettle, be sure the kettle is **completely empty of any product**.

DISASSEMBLY AND MAINTENANCE

In the event that repairs or replacement becomes necessary, the following procedures are suggested.

1. Drain and flush the piping surrounding the valve.
2. To remove handle, remove the socket head screw found on top of the valve handle with proper size Allen wrench.
3. Remove the nut and cap screws.
4. Separate the valve body halves.
5. Set the butterfly disc to the open position.
6. Squeeze the seal until oval shaped, then slide the short end of the stem from the seal.
7. Pinch the disc between the thumb and forefinger and pull the long end of the stem.
8. Check for and replace a cracked or worn seal, bushing, stem and disc, or screws.
9. Reassembly is opposite of disassembly.

HYDRAULIC SYSTEM

Use "Purity FG AW32" or equivalent oil > Fluid level - 13.62 U.S. gallons.

SERVICE

Set up regular schedule for checking the oil temperature, hydraulic hoses and keeping the equipment clean. A thick layer of dirt acts as an insulation and prevents the hydraulic system from cooling.

The hydraulic system has been adjusted and tested at the factory and no adjustment should be needed. If the unit fails to operate properly, all service work must be performed by a qualified service agent.

A thermostat controlled cooling system has been installed in the hydraulic system to maintain oil temperatures while in operation. The oil is cooled by cold water flowing through a heat exchanger alongside of the oil. A thermostat activates at 140° Fahrenheit oil temperature opening the valve and releasing cold water into the heat exchanger, cooling the oil.

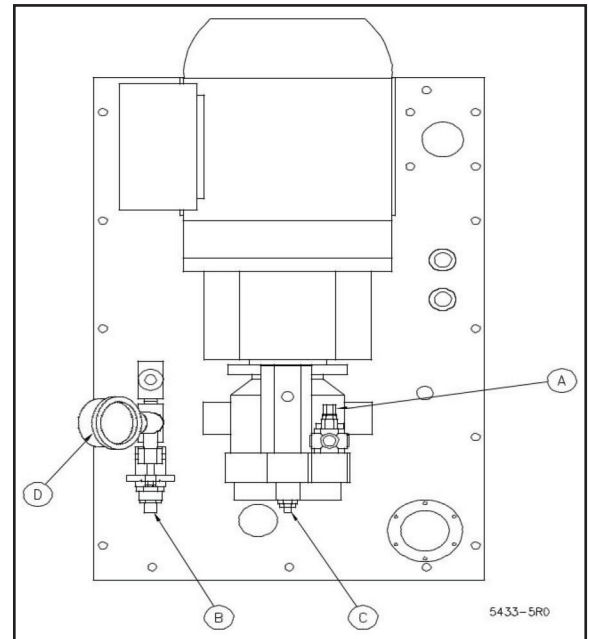
NOTICE

At least twice a year have an authorized service person clean and service the unit for maximum performance.

SETTING UP HYDRAULIC SYSTEM FOR MIXING KETTLES

SETTING MIXER SYSTEM PRESSURE

1. On the operator panel, switch "POWER" to on, "MIXER" to on, and set mixer speed to "STOP".
2. Turn trim relief stem, item "B", completely in.
3. Increase the pump pressure by turning "A" inwards, until gauge "D" reads 1700 psi. The pressure must be 300 psi higher than the pump setting.
4. Adjust trim relief "B" outwards until pressure indicated on gauge "D" begins to drop.
5. Lock the trim relief "B".
6. Decrease the pump pressure by turning "A" outwards, until gauge "D" reads 1400 psi and lock in place.



SETTING MIXER SYSTEM FLOW

1. On the operator panel, switch "POWER" to on, "MIXER" to on, and set mixer speed to "FAST", the maximum speed.
2. Increase or decrease flow to maximum rpm as listed, or less if requested by customer. Turn in "C" to decrease, turn out to increase.

KETTLE SIZE	RPM
40 gallon	54
60 gallon	48
80 gallon	43
100 gallon	40

CAUTION

Do Not exceed 54 RPM!

Decreasing the flow to less than 10 rpm may over-center the swash plate and damage the pump.

3. Use jam nut to lock adjusting screw when complete.

SETTING THE BRIDGE ACTUATOR

1. On the operator panel, switch “POWER” to on, “MIXER” to on, and set mixer speed to “STOP”.
2. The pressure reducing valve and associated gauge are located at the back of the hydraulic unit. Adjust it to 800 psi.
3. The speed of the actuator is controlled by an in-line flow control valve also located at the back of the unit. There is also a locking set screw provided on the adjusting knob.
4. Using the “RAISE/LOWER” tilt switch on the operator panel, adjust the flow control so that the stroke is completed at a safe speed.

TROUBLESHOOTING

EXTREMELY SLOW COOKING TIME

If cooking time is abnormally slow, this may be due to insufficient steam pressure and/or volume. Determine that pressure on incoming steam line at kettle is within 5 psi of rated kettle pressure. Note that pressures approaching the rated kettle pressure are liable to set off the safety relief valve. If required pressure is available to kettle, then volume of steam may not be sufficient. Minimum 3/4" pipe size is required to the kettle but if the steam generating source is at a great distance from the kettle, larger pipe will be required. Finally, the core of the steam supply pipe may have debris or scalants that impede steam flow and will require disassembly and inspection.

AIR VENTING INSTRUCTIONS

A steam trap assembly is plumbed to the exhaust (condensate) side of the kettle(s). The thermostatic trap is a mechanical device that closes on high temperature and opens when the temperature drops, allowing water which formed from the condensate to exhaust, but retain steam under pressure.

The temperatures required for the cooking process to function adequately must be greater than the boiling point of the liquid food product. The greater the steam pressure used, the higher the temperature and the quicker the cooking process. For example, steam pressurized at 30 psi reaches a temperature of 274 degrees Fahrenheit (135 degrees Celsius). Since air is an unsuitable media through which heat may be transferred, it should be exhausted from the jacket by opening the pressure relief valve until the air has been completely replaced by pressurized steam.

In the initial stages of the cooking process, when the steam comes in contact with the cold kettle bowl surface, it condenses and forms a large amount of water. The condensate water must be removed from the kettle jacket in order for the kettle to function adequately. The ball valve located at the base of the kettle jacket may be opened to remove the water. It may be necessary to repeat this procedure several times depending on the number of batches being cooked as each batch will create condensate. If the kettle appears to be slow in heating, this would indicate that there is water in the jacket. Open ball valve and drain. Close valve and commence operation of kettle.

HYDRAULIC SYSTEM TROUBLESHOOTING

SOLENOID VALVES FAILED TO OPERATE

1. Voltage too low will not complete the stroke of alternating current (AC) and the solenoid will burn out the coil.
2. Signal to both solenoids of a double solenoid valve simultaneously. One or both of the valves will be unable to complete their stroke and burn out. Make certain the electrical signal is interlocked so that this condition cannot exist.
3. Incorrect voltage or frequency will prevent operation or burn out coil.
4. Foreign matter in valve.
5. Oil too hot.

PUMP

1. Excessive noise caused by vacuum leak in suction line.
2. Misalignment of drive mechanism will cause high noise level in operation.
3. Relief set too high.
4. Return line above fluid level.
5. Reversed rotation.
6. Filter breather plugged.
7. Viscosity of oil too high.
8. Loose or worn pump parts.
9. Air leak at pump shaft seal.
10. Oil too low, drawing in air.
11. Air bubbles in intake oil.

EXCESSIVE WEAR

1. Abrasive material in oil causing wear.
2. Oil viscosity too low.
3. Pump misalignment.
4. Air being drawn in through inlet of pump.
5. System pressure exceeds pump rating.

BROKEN INTERNAL PARTS

1. Lack of oil.
2. Excessive torquing of housing bolts.
3. Solid matter being drawn in from reservoir.

DIRTY OIL

1. Components not cleaned properly after servicing.
2. Air breather left off.
3. Filter dirty or ruptured.

FOAMING OIL

1. Return line not below oil level.
2. Oil contaminated.
3. Suction leak to pump.

MOISTURE IN OIL

1. Water in oil supply.
2. Extreme temperature differential.

OVERHEATING OF SYSTEM

1. Continuous operation at relief setting.
 - 1) Stalling under load.
 - 2) Viscosity of oil too high.
2. Excessive slippage or internal leakage. Fluid too low.
3. System relief valve set too high.
4. Power unit ambient too high.
5. Insufficient volume of water supply to oil cooler.

APPENDIX 'A'

**SAFETY DATA SHEET**
DOW CHEMICAL CANADA ULC**Product name:** DOWFROST™ HD Heat Transfer Fluid, Dyed**Issue Date:** 01/19/2017**Print Date:** 01/23/2017

DOW CHEMICAL CANADA ULC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: DOWFROST™ HD Heat Transfer Fluid, Dyed**Recommended use of the chemical and restrictions on use**

Identified uses: Intended as a heat transfer fluid for closed-loop systems. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

COMPANY IDENTIFICATION

DOW CHEMICAL CANADA ULC
#2400, 215 - 2ND STREET S.W.
CALGARY AB T2P 1M4
CANADA

Customer Information Number:

800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER**24-Hour Emergency Contact:** 1-888-226-8832**Local Emergency Contact:** 613-996-6666

2. HAZARDS IDENTIFICATION

Hazard classification

This product is not hazardous under the criteria of the Hazardous Products Regulation (HPR) as implemented under the Workplace Hazardous Materials Information System (WHMIS 2015).

Other hazards

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a mixture.

Component	CASRN	Concentration
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Propylene glycol	57-55-6	> 93.0 %
Water	7732-18-5	< 5.0 %
Dipotassium hydrogen phosphate	7758-11-4	< 5.0 %

4. FIRST AID MEASURES

Description of first aid measures

General advice: If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Small spills: Absorb with materials such as: Cat litter. Sawdust. Vermiculite. Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Conditions for safe storage: Do not store in: Galvanized steel. Opened or unlabeled containers. Store in the following material(s): Carbon steel. Stainless steel. Store in original unopened container. See Section 10 for more specific information. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Propylene glycol	US WEEL	TWA	10 mg/m3
	CA ON OEL	TWAEV Total	155 mg/m3 50 ppm
	CA ON OEL	TWAEV	10 mg/m3
	CA ON OEL	TWA	155 mg/m3 50 ppm
	CA ON OEL	TWA	10 mg/m3
	CA ON OEL	TWA Vapour and aerosols	155 mg/m3 50 ppm
	CA ON OEL	TWA aerosol	10 mg/m3

Consult local authorities for recommended exposure limits.

Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Wear clean, body-covering clothing.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. In misty atmospheres, use an approved particulate respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquid.
Color	Yellow to green
Odor	Characteristic
Odor Threshold	No test data available
pH	9.5 50% <i>Literature</i>
Melting point/range	Not applicable to liquids
Freezing point	supercools
Boiling point (760 mmHg)	152 °C <i>Literature</i>
Flash point	closed cup 104 °C <i>Pensky-Martens Closed Cup ASTM D 93</i> Propylene glycol., (based on major component)
Evaporation Rate (Butyl Acetate = 1)	< 0.5 <i>Estimated.</i>
Flammability (solid, gas)	Not applicable to liquids
Lower explosion limit	2.6 % vol <i>Literature</i> Propylene glycol.
Upper explosion limit	12.5 % vol <i>Literature</i> Propylene glycol.

Vapor Pressure	2.2 mmHg <i>Literature</i>
Relative Vapor Density (air = 1)	>1.0 <i>Literature</i>
Relative Density (water = 1)	1.06 at 20 °C / 20 °C <i>Literature</i>
Water solubility	100 % <i>Literature</i>
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	371 °C <i>Literature</i> Propylene glycol.
Decomposition temperature	No test data available
Kinematic Viscosity	43.4 cSt at 20 °C <i>Literature</i>
Explosive properties	No data available
Oxidizing properties	No data available
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.
Hygroscopic

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose.
Generation of gas during decomposition can cause pressure in closed systems. Avoid direct sunlight or ultraviolet sources.

Incompatible materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes. Alcohols. Ethers. Organic acids.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

For the major component(s): Propylene glycol.

LD50, Rat, > 20,000 mg/kg

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

For the major component(s): Propylene glycol.
LD50, Rabbit, > 20,000 mg/kg

Acute inhalation toxicity

At room temperature, exposure to vapor is minimal due to low volatility. Mist may cause irritation of upper respiratory tract (nose and throat).

For the major component(s):
LC50, Rat, 4 Hour, vapour, 6.15 mg/l No deaths occurred following exposure to a saturated atmosphere.

Skin corrosion/irritation

Prolonged contact is essentially nonirritating to skin.
Repeated contact may cause flaking and softening of skin.

Serious eye damage/eye irritation

May cause slight temporary eye irritation.
Corneal injury is unlikely.

Sensitization

For the major component(s):
Did not cause allergic skin reactions when tested in humans.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

Carcinogenicity

Similar formulations did not cause cancer in laboratory animals.

Teratogenicity

For the major component(s): Did not cause birth defects or any other fetal effects in laboratory animals.

Reproductive toxicity

For the major component(s): In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.

Mutagenicity

In vitro genetic toxicity studies were negative. For the major component(s): Animal genetic toxicity studies were negative.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity

Propylene glycol

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, 40,613 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

LC50, Ceriodaphnia dubia (water flea), static test, 48 Hour, 18,340 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

ErC50, Pseudokirchneriella subcapitata (green algae), 96 Hour, Growth rate inhibition, 19,000 mg/l, OECD Test Guideline 201

Toxicity to bacteria

NOEC, Pseudomonas putida, 18 Hour, > 20,000 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Ceriodaphnia dubia (water flea), semi-static test, 7 d, number of offspring, 13,020 mg/l

Dipotassium hydrogen phosphate

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 48 Hour, > 900 mg/l, Method Not Specified.

Persistence and degradability

Propylene glycol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

10-day Window: Pass

Biodegradation: 81 %

Exposure time: 28 d

Method: OECD Test Guideline 301F or Equivalent

10-day Window: Not applicable

Biodegradation: 96 %

Exposure time: 64 d

Method: OECD Test Guideline 306 or Equivalent

Theoretical Oxygen Demand: 1.68 mg/mg

Chemical Oxygen Demand: 1.53 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	69.000 %
10 d	70.000 %
20 d	86.000 %

Photodegradation**Atmospheric half-life:** 10 Hour**Method:** Estimated.**Dipotassium hydrogen phosphate****Biodegradability:** Biodegradation is not applicable.**Bioaccumulative potential****Propylene glycol****Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient: n-octanol/water(log Pow):** -1.07 Measured**Bioconcentration factor (BCF):** 0.09 Estimated.**Dipotassium hydrogen phosphate****Bioaccumulation:** No bioconcentration is expected because of the relatively high water solubility.**Mobility in soil****Propylene glycol**

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): < 1 Estimated.**Dipotassium hydrogen phosphate**

No relevant data found.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION

TDG

Not regulated for transport

Classification for SEA transport (IMO-IMDG):**Transport in bulk
according to Annex I or II
of MARPOL 73/78 and the
IBC or IGC Code**

Not regulated for transport

Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Not regulated for transport

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Canadian Domestic Substances List (DSL)

This product contains at least one substance which is not listed on the Canadian Domestic Substances List (DSL).

16. OTHER INFORMATION

Hazard Rating System**NFPA**

Health	Fire	Reactivity
0	1	0

Revision

Identification Number: 101199333 / A208 / Issue Date: 01/19/2017 / Version: 7.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

CA ON OEL	Canada. Ontario OELs
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TWA	8-hr Time Weighted Average
TWAEV	time-weighted average exposure value
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW CHEMICAL CANADA ULC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.



SAFETY DATA SHEET

1. Identification

Product name	FM HYDRAULIC OIL 32
Other means of identification	No data available.
Recommended use:	Lubricating fluid
Restrictions on use:	Industrial use only

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name: Fuchs Lubricants Co.
Address: 17050 Lathrop Avenue
Harvey, Illinois 60426
Telephone: 708-333-8900
Fax: 708-333-9180

Contact Person: EHS Department
E-mail: sds@fuchsus.com

Emergency telephone number: 708-333-8900 (Bus. hrs) 800-255-3924 (24 hrs)

2. Hazard(s) identification

Hazard Classification

Not classified as hazardous under 29CFR 1910.1200 (HazCom 2012).

Label Elements

Hazard Symbol:	No symbol
Signal Word:	No signal word.
Hazard Statement:	not applicable
Precautionary Statement	not applicable

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients



SAFETY DATA SHEET

Hazardous Component(s):

Chemical name	CAS-No.	Concentration
White mineral oil	Confidential	60 - 100%

Specific chemical identities and/or exact percentages have been withheld as trade secrets.

4. First-aid measures

Ingestion:	Rinse mouth thoroughly. Call a POISON CENTER/doctor/.../if you feel unwell. Do NOT induce vomiting.
Inhalation:	Move to fresh air. Call a POISON CENTER/doctor/.../if you feel unwell.
Skin Contact:	Remove contaminated/saturated clothing and shoes. Wash contact areas with soap and water. If skin irritation occurs: Get medical advice/attention.
Eye contact:	Flush thoroughly with water. If irritation occurs, get medical assistance. Continue to rinse for at least 15 minutes.

Most important symptoms/effects, acute and delayed

Symptoms:	No data available.
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Indication of immediate medical attention and special treatment needed

Treatment:	Get medical attention as appropriate or if symptoms persist.
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5. Fire-fighting measures

General Fire Hazards:	No unusual fire or explosion hazards noted.
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Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Water spray, fog, CO ₂ , dry chemical, or regular foam. Use fire-extinguishing media appropriate for surrounding materials.
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Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.
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Specific hazards arising from the chemical:	Heat may cause the containers to explode. During fire, gases hazardous to health may be formed.
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Special protective equipment and precautions for firefighters

Special fire fighting procedures:	No data available.
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SAFETY DATA SHEET

Special protective equipment for fire-fighters:

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:

See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unauthorized personnel away. Ensure adequate ventilation.

Methods and material for containment and cleaning up:

Absorb with sand or other inert absorbent. Stop the flow of material, if this is without risk.

Environmental Precautions:

Avoid release to the environment. Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling:

Observe good industrial hygiene practices. Wear appropriate personal protective equipment. Do not expose to intense heat as product may expand and pressurize container.

Conditions for safe storage, including any incompatibilities:

Store in original tightly closed container. Avoid contact with oxidizing agents. Store away from incompatible materials.

8. Exposure controls/personal protection

Exposure Limits

Chemical name	type	Exposure Limit Values	Source
White mineral oil - Inhalable fraction.	TWA	5 mg/m ³	US. ACGIH Threshold Limit Values (03 2012)
White mineral oil - Mist.	PEL	5 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)

Protective Measures:

Use personal protective equipment as required.

Respiratory Protection:

In case of inadequate ventilation use suitable respirator. Seek advice from supervisor on the company's respiratory protection standards.

Eye Protection:

Wear safety glasses with side shields (or goggles).

Skin and Body Protection:

Wear chemical-resistant gloves, footwear, and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.



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Hygiene measures:

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Contaminated work clothing should not be allowed out of the workplace. Discard contaminated footwear that cannot be cleaned. Avoid contact with skin, eyes, and clothing.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	No data available.
Color:	Water-white
Odor:	Mild
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	No data available.
Initial boiling point and boiling range:	No data available.
Flash Point:	> 100 °C (212 °F)
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	No data available.
Vapor density:	No data available.
Relative density:	0.8607
Solubility(ies)	
Solubility in water:	Insoluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	32 mm ² /s (40 °C)

10. Stability and reactivity

Reactivity: Not reactive during normal use.

Chemical Stability: Material is stable under normal conditions.



SAFETY DATA SHEET

Possibility of hazardous reactions:	None under normal conditions.
Conditions to avoid:	Avoid heat or contamination.
Incompatible Materials:	No data available.
Hazardous Decomposition Products:	Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapors.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May be ingested by accident. Ingestion may cause irritation and malaise.
Inhalation:	Inhalation is the primary route of exposure. In high concentrations, vapors, fumes or mists may irritate nose, throat and mucus membranes.
Skin Contact:	Prolonged skin contact may cause redness and irritation.
Eye contact:	Eye contact is possible and should be avoided.

Symptoms related to the physical, chemical and toxicological characteristics

Ingestion:	No data available.
Inhalation:	No data available.
Skin Contact:	No data available.
Eye contact:	No data available.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral Product:	Not classified for acute toxicity based on available data.
Dermal Product:	ATEmix (): 2000 - 5000 mg/kg
Inhalation Product:	Not classified for acute toxicity based on available data.
Repeated dose toxicity Product:	No data available.

Skin Corrosion/Irritation Product:

No data available.



SAFETY DATA SHEET

Serious Eye Damage/Eye Irritation

Product: No data available.

Respiratory or Skin Sensitization

Product: No data available.

Carcinogenicity

Product: No data available.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:

No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

No carcinogenic components identified

Germ Cell Mutagenicity**In vitro**

Product: No data available.

In vivo

Product: No data available.

Reproductive toxicity

Product: No data available.

Specific Target Organ Toxicity - Single Exposure

Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure

Product: No data available.

Aspiration Hazard

Product: No data available.

Other effects:

No data available.

12. Ecological information**General information:**

This product has not been evaluated for ecological toxicity or other environmental effects.

13. Disposal considerations



SAFETY DATA SHEET

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Dispose of waste at an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. It is the responsibility of the product user or owner to determine at the time of disposal, which waste regulations must be applied.

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

14. Transport information

DOT
Not regulated.

IMDG
Not regulated.

IATA
Not regulated.

15. Regulatory information

US Federal Regulations

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

None

SARA 313 (TRI Reporting)

None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65

No component is regulated by CA Prop 65.

16. Other information, including date of preparation or last revision

Issue Date: 24.06.2016

Revision Date: 24.06.2016

Version #: 1.0



SAFETY DATA SHEET

Further Information:

No data available.

Disclaimer:

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

KDMTL-40, KDMTL-60, KDMTL-80, KDMTL-100, KDMTL-40-2, KDMTL-60-2, KDMTL-80-2 & KDMTL-100-2 DIRECT STEAM SINGLE & TWIN MIXER KETTLES



A product with the Crown name incorporates the best in durability and low maintenance. We all recognize, however, that replacement parts and occasional professional service may be necessary to extend the useful life of this appliance. When service is needed, contact a Crown Authorized Service Agency, or your dealer. To avoid confusion, always refer to the model number, serial number, and type of your appliance.



SOUTHBEND STEAM
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