



**KLS-G SERIES
GAS STATIONARY STEAM JACKETED KETTLE
PARTS AND SERVICE MANUAL**

EFFECTIVE NOVEMBER 3, 2015

Superseding All Previous Parts Lists.

The Company reserves the right to make substitution in the event that items specified are not available.

ERRORS: Descriptive and/or typographic errors are subject to correction.

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TABLE OF CONTENTS

GAS SYSTEM ADJUSTMENTS	3
KETTLE WATER, VACUUM & CONTROL CIRCUIT FUSES.....	5
CONVERTING BETWEEN NATURAL AND PROPANE GAS	6
TROUBLESHOOTING.....	7
ILLUSTRATED PARTS LIST	
KETTLE PARTS	8
BURNER ASSEMBLY	14
DRAW OFF VALVES	16
HINGED COVER ASSEMBLY	18
COVER ASSEMBLY.....	19
COVER ASSEMBLY.....	20
MATERIAL SAFETY DATA SHEET.....	21

GAS SYSTEM ADJUSTMENTS

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.

GENERAL

When any difficulty arises always check that the unit has been connected to the gas supply type and voltage for which it was supplied. This can be done by examining the serial plate on the lower right side of the unit. It will list the gas type and voltage for which the unit was manufactured.

Wiring diagrams for the unit are located in a small envelope affixed to the rear side of the front control panel.

UNIT	TOTAL INPUT	ORIFICE SIZE	
		Natural	Propane
KLS-20G	100,000 BTU/Hour	30	45
KLS-30G	100,000 BTU/Hour	30	45
KLS-40G	100,000 BTU/Hour	30	45
KLS-60G	130,000 BTU/Hour	23	39
KLS-80G	150,000 BTU/Hour	30	45
KLS-100G	150,000 BTU/Hour	30	45

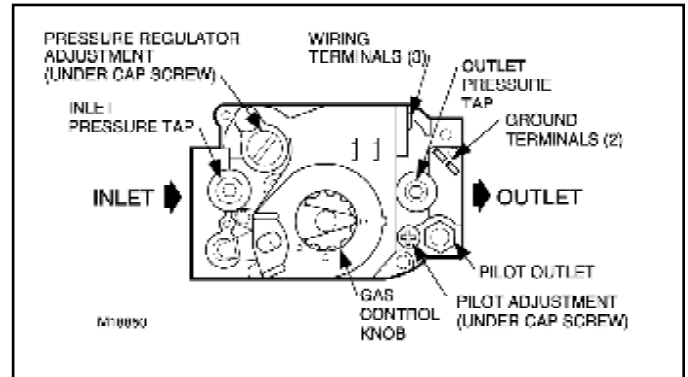
Manifold Pressure

Natural Gas 4 inches W.C.

LP Gas 10 inches W.C.

PILOTS

The pilot adjustment is part of the combination control valve located just behind the lower front access door. It is located on the center left side of the control just below the large slotted screw head. Remove the large slotted screw; below this is a second slotted screw used for adjustment of the pilot burner flame.

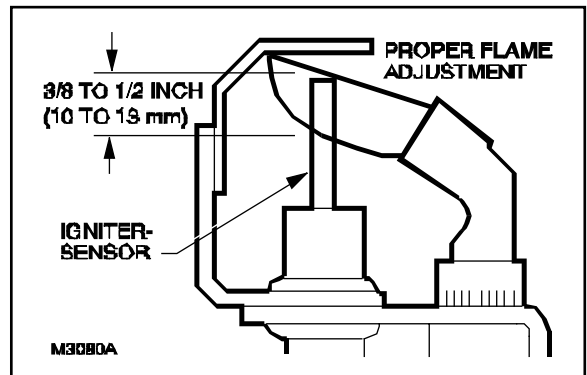


The front burner shield should be removed to see the pilot. The pilot should be adjusted as follows:

Adjust the pilot burner flame

The pilot flame should envelop 3/8 to 1/2 inch [10 to 13 mm] of the igniter-sensor tip. To adjust the pilot flame:

1. Remove the pilot adjustment cover screw.
2. Turn the inner adjustment screw clockwise to decrease or counterclockwise to increase the pilot flame.
3. Always replace the cover screw after adjustment and tighten firmly to ensure proper operation.



Pilot Orifice Sizes

Natural 0.018 IN

Propane 0.010 IN.

GAS SYSTEM ADJUSTMENTS

GAS PRESSURE REGULATOR

The gas pressure regulator is an integral part of the combination gas control located just behind the lower front access door. The pressure regulator adjustment is on the lower right side of the gas control. The large slotted cap must be removed to access the adjustment screw.

To check the manifold pressure a pressure gauge (manometer) must be connected to the 1/8" NPT pressure tap on the gas manifold. With the gas off, connect your pressure indicating instrument to the manifold with a fitting appropriate for your instrument.

1. Turn the unit on; with main burners on, read the manifold pressure. The pressure should be 4 inches water column (W.C.) .2 inches W.C. for natural gas or 10 inches W.C. for propane gas. Adjust the pressure regulator to obtain the appropriate pressure. Check serial plate on lower right side of unit to confirm exact gas type and manifold pressure for your unit.

When pressure has been correctly adjusted turn unit off. Remove pressure indicating instrument and replace the 1/8" NPT plug in manifold. Replace regulator cap and close access door.

THERMOSTAT

The thermostat adjustment should not be changed. Check the following before changing the thermostat:

1. With kettle cool, the pressure reading on the pressure gauge should be in the green vacuum zone (below 0 psi). If not, see "Re-establishing Vacuum" section.
2. Check that the pressure switch is not set too high or too low and causing the out of adjustment condition. A voltmeter should be used by a properly trained serviceman to determine if the pressure switch or thermostat is actually cycling the burners. If the pressure switch is found to be the problem, see "Pressure Switch" section.

After verifying that the pressure switch is set and operating properly, the thermostat may be adjusted using the set screw inside the stem. The thermostat should cycle off at a gauge pressure reading of 30 psi. Turn set screw clockwise to decrease pressure and counterclockwise to increase pressure.

PRESSURE SWITCH

The pressure switch should not be adjusted until it is determined to be the cause of an operating pressure deficiency. See "Thermostat" section to determine if the source of difficulty is the pressure switch or thermostat.

The major difficulties caused by pressure switch misadjustment are:

1. Pressure relief valve opening, especially on preheat from a cold start to 275 degrees Fahrenheit (135°C) (pressure switch set too high).
2. Burners are being shut down by pressure switch, not the thermostat. (Pressure switch set too low.)

The pressure switch is preset for proper operation from the factory. It is adjusted to the maximum pressure, however not high enough to cause the pressure relief valve to open. This setting will be slightly different on different kettles due to variations in the pressure relief valves. During preheat to the maximum thermostat setting (275 degrees Fahrenheit) (135°C), from either a cold condition or a lower temperature setting, the temperature may overshoot the thermostat setting and shut down the burners by the pressure switch. This is normal, however, after the kettle cycles several times (empty) the thermostat will begin cycling the unit.

TO ADJUST PRESSURE SWITCH:

1. To obtain access to the pressure switch, the front panel must be removed. Remove the screws on either side of the panel. Be sure to support the panel to avoid excessive strain on the wiring.
2. To increase the pressure setting turn the white ribbed knob clockwise; to decrease the pressure, turn it counterclockwise. Use the centre of the black ring as an indicator.
3. With the kettle empty and completely cold, bypass the thermostat by moving the single terminal side wire to the double terminal side connector on the thermostat. Turn kettle on.
4. Pressure in kettle (read pressure gauge on front panel) should reach a maximum of 35 psi and pressure relief valve should not open. Kettle pressure may rise 3 or 4 psi even after burners shut down.
5. Relief valve should not open when kettle pressure is 40 psi; pressure switch setting is satisfactory.
6. If relief valve opens, reduce setting on pressure switch, cool kettle completely by running cold water through it and repeat steps 3 - 6.
7. If pressure in kettle is below 30 psi when burners shut off, increase setting of pressure switch, cool kettle completely by running cold water through it and repeat steps 3 - 7.
8. When adjustment is complete, move wire from shorted terminal on the thermostat back to the appropriate terminal and replace the front panel.

KETTLE WATER, VACUUM & CONTROL CIRCUIT FUSES

ADDING WATER

It may be necessary to replenish water in the jacket when the low water indicator comes on. Do so as follows:

1. Unit should be completely cold and off.
2. Lift handle of pressure relief valve to release vacuum in kettle. (Relief valve is at right rear of kettle).
3. Remove air vent nut on the tee located between kettle and relief valve.
4. Using pure distilled water only, pour the water into the opening. (A funnel will be helpful). Water will enter the kettle slowly, as air must escape through the same hole. Water should be added until the water level at the sight glass is half way between the minimum and maximum levels.
5. When sufficient water has been added, replace and tighten the nut.
6. Vacuum must be re-established. (See Re-establishing Vacuum).

For reference, the total amount of distilled water contained in each unit, and amount to be added in a low water condition is listed below:

MODEL	TOTAL AMOUNT OF DISTILLED WATER	AMOUNT OF WATER TO BE ADDED IN A LOW WATER CONDITION
KLS-20G	4.8 Gallons	155 fl. oz. (4 L)
KLS-40G	6.9 Gallons	236 fl. oz. (7 L)
KLS-60G	9.5 Gallons	338 fl. oz. (10 L)
KLS-80G & KLS-100G	16.3 Gallons	721 fl. oz. (10 L)

RE-ESTABLISHING VACUUM:

With the kettle completely cold a vacuum of 25 to 30 inches mercury column (M.C.) should be maintained as indicated in the green zone on the pressure gauge on the front control panel. If at any time the vacuum is not in the green zone, vacuum should be re-established.

With the kettle empty, turn the thermostat knob to the highest temperature. When the temperature pilot light goes off, open air vent nut one (1) full turn for 20 seconds and then close and tighten the nut. This should remove the air and any loss in performance should return.

Should the kettle fail to maintain a vacuum after repeated attempts to establish it, further checks should be made to see if the pressure relief valve is leaking or if there are any leaks in the pressure relief valve piping, copper lines

going to the pressure switch, pressure gauge or thermostat fitting.

CONTROL CIRCUIT FUSES

The control circuit is protected by a 3 amp. fuse which is located inside control panel, top right side above transformer.

Should the unit fail to turn on, check this fuse by removing it and either replacing it or testing it with a continuity tester. If the fuse is good, check the main power circuit breaker, which should be external to the kettle.

CONVERTING BETWEEN NATURAL AND PROPANE GAS



WARNING

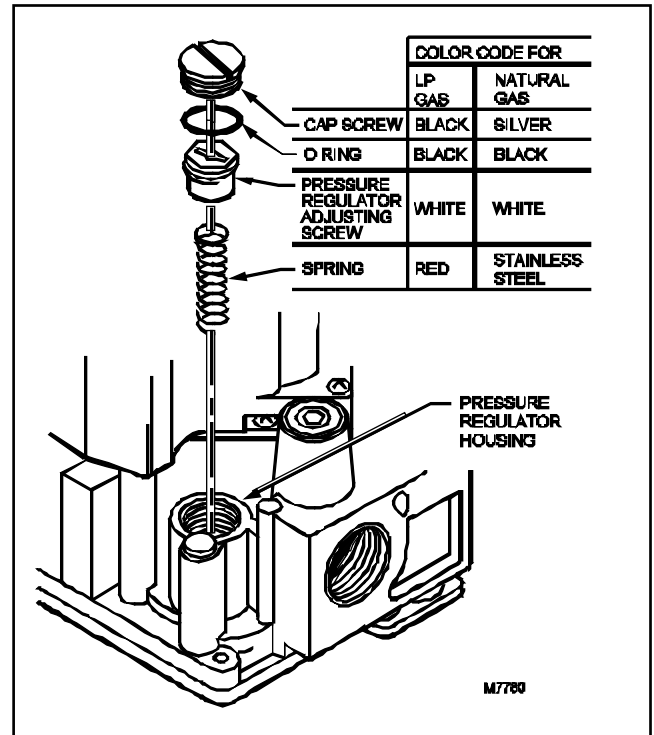
Fire or explosion hazard can cause property damage, severe injury, or death.

1. Do not attempt to use a gas control set for natural gas on propane gas or gas control set for LP gas on natural gas.
2. When making conversion, main and pilot burner orifices **MUST** be changed to meet appliance manufacturer's specifications.

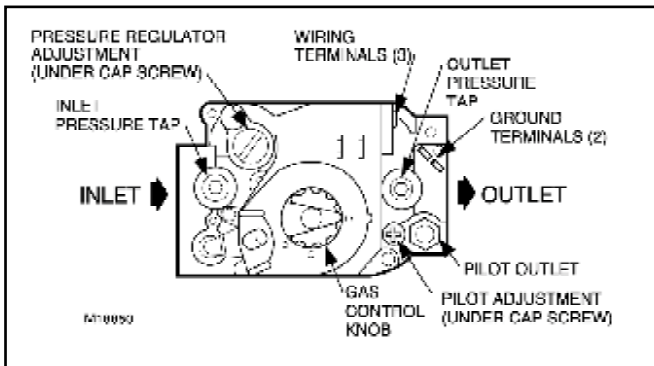
Standard- or slow-opening gas controls may be converted from one gas to another. To convert from natural gas to LP use the 393691 LP Conversion Kit that is included with the VR8304M Gas Control. To convert from LP to natural gas use the 394588 Natural Gas Conversion Kit (order separately). Step-opening gas controls cannot be converted.

To convert control from one gas to another:

1. Turn off main gas supply to the appliance.
2. Remove the regulator cap screw and pressure regulator adjusting screw.
3. Remove the existing spring.
4. Insert the replacement spring with tapered end down.
5. Install the new plastic pressure regulator adjustment screw so that the top of the screw is flush (level) with the top of the regulator. Turn the pressure regulator adjustment screw clockwise six complete turns. This provides a preliminary pressure setting of about 10 inch (254 mm) W.C. for LP regulator and 4 inch (102 mm) W.C. for natural gas regulator.
6. Check the regulator setting either with a manometer or by clocking the gas meter.
7. Install the new cap screw.
8. Mount conversion label on control.
9. Install control and appliance according to appliance manufacturer's instructions.



Gas Conversion Kit

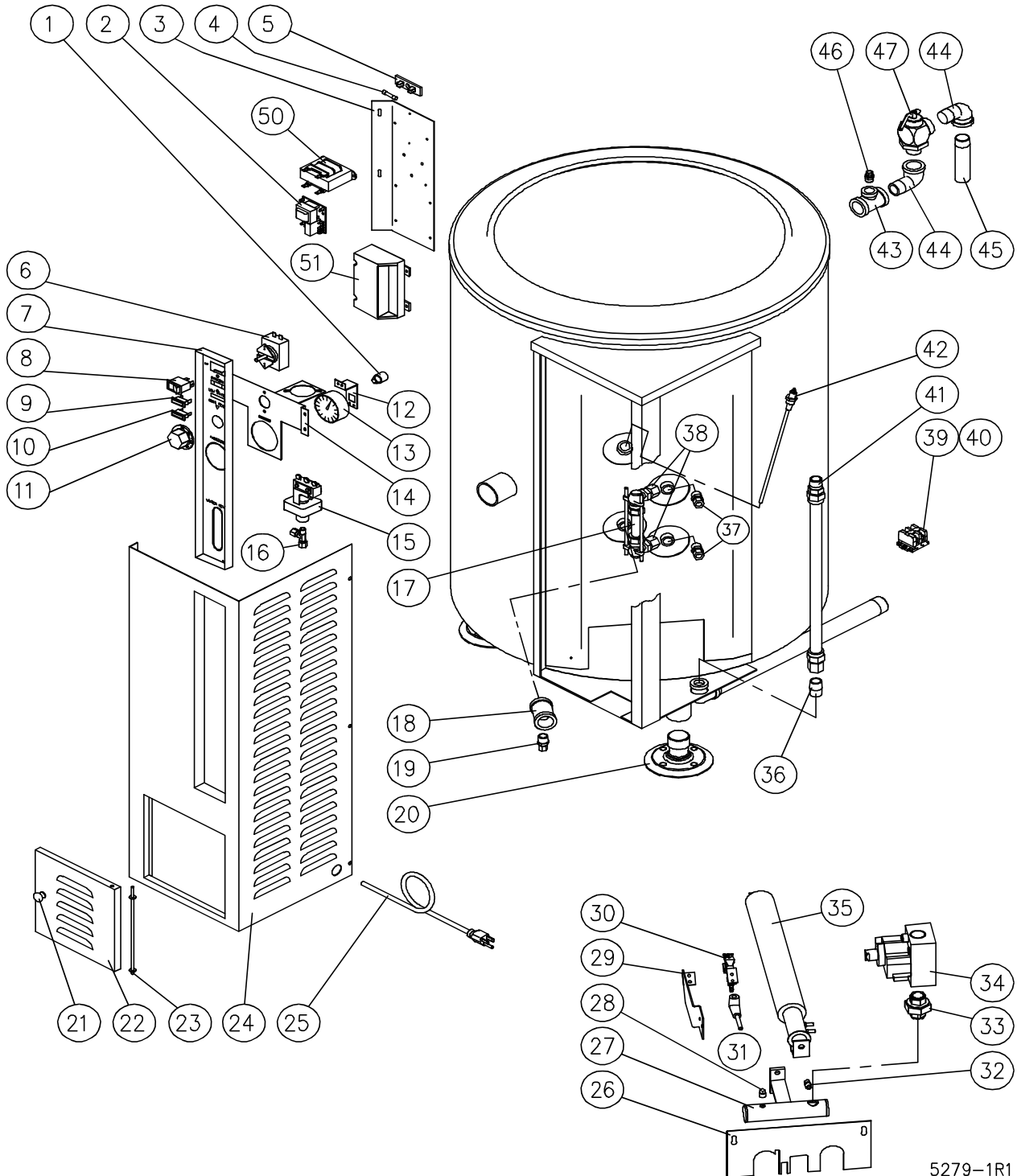


TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE(S)
Unit will not come on	- Power switch is off.
	- Unit not plugged in.
	- Main power supply off.
	- Bad electronic module.
	- Bad low water control.
	- Bad spark igniter.
	- Bad intermittent pilot burner.
	- Fuse in unit blown.
Unit will turn on electrically but will not heat	- Lockout has occurred.
	- Thermostat not on.
	- Gas control valve off.
	- Main gas supply off.
	- Low water.
	- Bad thermostat.
	- Bad pressure switch.
	- Bad gas control valve.
	- Bad spark igniter.
	- Bad igniter cable.
	- Bad intermittent pilot burner.
	- Faulty gas control.
Excessive flame rollout on ignition, carboning	- Natural gas unit on propane.
	- Excessive gas pressure.
	- Incorrect orifice size.
	- Faulty regulator in gas control.
Unit slow to preheat and slow to recover	- Propane gas on natural.
	- Low gas pressure.
	- Incorrect orifice sizes.
	- Loss of vacuum.
	- Faulty regulator in gas control.
Unit continuously locks out	- Pilot gas adjusted too low.
	- Excessive draft condition.
	- Excessive steam around bottom of unit during operation of cleaning.
	- Faulty transformer.
	- Faulty electronic module.
	- Faulty ignitor cable.
	- Faulty spark igniter.
	- Faulty gas control.

KETTLE PARTS

20 - 60 GALLON MODELS



5279-1R1

KETTLE PARTS

20 - 60 GALLON MODELS

ITEM	PART NO.	DESCRIPTION	QUANTITY			
			20	30	40	60
1	40453	Elbow, 1/4 C x 1/4 FPT	1	1	1	1
2	40542	Level Control	1	1	1	1
3	41333	Component Mounting Bracket	1	1	1	1
4	41861	Fuse, 3 Amp., 250V	1	1	1	1
5	41863	Fuse Holder	1	1	1	1
6	40046	Thermostat	1	1	1	1
7	40033	Recess Control Panel	1	1	1	1
***	42548	Control Decal - English	1	1	1	1
***	42475	Control Decal - French	1	1	1	1
8	41889	Power Switch	1	1	1	1
9	43391	Pilot Light - 28 Volt, Red Cooking	1	1	1	1
10	42429	Pilot Light - 125 V, Amber - Low Water	1	1	1	1
11	41006	Thermostat Dial	1	1	1	1
12	40815	Pressure Gauge Bracket	1	1	1	1
13	40907	Pressure Gauge	1	1	1	1
14	40022	Support Bracket	1	1	1	1
15	42443	Pressure Switch	1	1	1	1
16	40456	Tee, 1/4 C x 1/8 MPT	1	1	1	1
17	41077	Sight Glass Assembly	1	1	1	1
*	41877	Sight Glass	1	1	1	1
*	42434	Washer	2	2	2	2
*	--	Brass Washer	2	2	2	2
*	--	Rods	2	2	2	2
18	42440	Tee, 3/8" - 3000 lb	1	1	1	1
19	40425	Connector 1/4 C x 3/8 MPT	1	1	1	1
20	41474	Adjustable Foot	3	3	3	3
21	40058	Door Knob	1	1	1	1
22	40038	Access Door Assembly	1			
	40039	Access Door Assembly		1	1	
	40040	Access Door Assembly				1
	40049	Door Hinge	1	1	1	1
	40062	Corner Front Panel	1			
	40063	Corner Front Panel		1		
	40064	Corner Front Panel			1	
	--	Corner Front Panel				1
	40663	Cord Set, 120V	1	1	1	1
	41241	Front Shield	1			
	41245	Front Shield		1	1	1
	40035	Manifold Assembly	1	1	1	1
	41813	Pipe Plug, 1/8 NPT	1	1	1	1
	40709	Pilot Bracket	1	1	1	

KETTLE PARTS

20 - 60 GALLON MODELS

ITEM	PART NO.	DESCRIPTION	QUANTITY			
			20	30	40	60
	40723	Pilot Bracket				1
**	42349	Ignitor/Sensor Pilot, Natural	1	1	1	1
	42350	Ignitor/Sensor Pilot, LP	1	1	1	1
	41039	Ignitor Cable	1	1	1	1
**	42401	Burner Orifice # 30, Natural Gas	2	2	2	
	42402	Burner Orifice # 45, LP	2	2	2	
**	42403	Burner Orifice # 26, Natural Gas				2
	42404	Burner Orifice # 41, LP				2
	41797	Union, 1/2 NPT	1	1	1	1
**	41108	Combination Gas Control, Natural Gas	1	1	1	1
	41109	Combination Gas Control, LP	1	1	1	1
	40320	Burner	2			
	41045	Combination Gas Control – Natural, 120V after 10/27/05	1	1	1	1
	41046	Combination Gas Control – LP, 120V after 10/27/05	1	1	1	1
	40321	Burner		2	2	
	40322	Burner				2
	41773	Close Nipple, 1/2	1	1	1	1
	40431	Connector, 3/8 C x 3/8 MPT	2	2	2	2
	40417	Connector, 3/8 C x 3/8 FPT	2	2	2	2
	40708	Terminal Block	2	2	2	2
	40707	End Section	1	1	1	1
	42269	Gas Flex Hose	1	1	1	1
	40466	Probe, 9-3/4"	1			
	40467	Probe, 9-1/4"		1	1	1
	41794	Tee, 3/4 x 3/4 x 3/8	1	1	1	1
	41791	St. Elbow, 3/4"	1	1	1	1
	41044	Down Tube	1	1	1	1
	43392	Air Vent	1	1	1	1
	40613	Relief Valve	1	1	1	1
*	40287	Flue Box	1			
	40288	Flue Box		1	1	
	40289	Flue Box				1
*	40054	Faucet Bracket	1	1	1	1
	41885	Transformer, 115/230 - 24V, 50/60 Hz, 50 VA	1	1	1	1
	42351	Ignition Module Kit	1	1	1	1
*	43393	Lighting Instructions	1	1	1	1
*	--	Pilot Tube, 1/4" x 20"	1	1	1	1
*	--	Bottom Cover	1			
	--	Bottom Cover		1	1	
	--	Bottom Cover				1

* NOT SHOWN. ** SELECT AS REQUIRED.

1G-00005 Wiring Diagram, 120V 1G-00006 Wiring Diagram, 208 - 240V

80 - 100 GALLON MODELS



KETTLE PARTS

80 - 100 GALLON MODELS

ITEM	PART NO.	DESCRIPTION	QUANTITY	
			80	100
1	41249	Flue Box Assembly	1	1
2	40548	Air Vent	1	1
3	41861	Fuse 3A, 250V	1	1
4	41863	Fuse Holder	1	1
5	40612	Relief Valve, 35 psi	1	1
6	40542	Level Control	1	1
7	40033	Control Panel	1	1
** 8	42548	English Label	1	1
	42475	French Label	1	1
9	41093	Ignition Module DSI 3 Trial Ignition	1	1
10	42457	Power Switch	1	1
11	40046	Thermostat	1	1
12	43486	Pressure Gauge Bracket	1	1
13	43240	Pilot Light, Cooking, Red, 28V	1	1
14	43487	Pressure Switch	1	1
15	40907	Pressure Gauge	1	1
16	43488	Pilot Light, Low Water, Amber, 120V	1	1
17	41006	Dial	1	1
18	43241	Pressure Switch Bracket	1	1
19	41474	Leg Adjustable Pad Assembly	4	4
20	40001	Front Panel	1	
	40000	Front Panel		1
21	41228	Access Door	1	1
** 22	41108	Combination Gas Control - Natural Gas	1	1
	41109	Combination Gas Control - Propane	1	1
	41045	Combination Gas Control – Natural, 120V for units after 10/27/05	1	1
	41046	Combination Gas Control – LP, 120V for units after 10/27/05	1	1
23	42860	Bottom Cover	1	1
24	41855	Gas Flex Hose, 3/4" x 18"	1	1
25	43489	Burner Basket Shield/Bracket	1	1
26	41077	Sight Glass Assembly	1	1
	41877	Gauge Glass, 5/8 x 4-3/4	1	1
	41743	Washers	2	2
	41744	Brass Washer	2	2
	41741	Rod	2	2
27	40707	Terminal Block End Section	1	1
28	40708	Terminal Block Section	2	2
29	41027	Low Water Probe	1	1
30	41333	Component Mounting Bracket	1	1
31	43490	Burner Shield	1	1
32	42706	Cord Set, 120V	1	1

KETTLE PARTS

80 - 100 GALLON MODELS

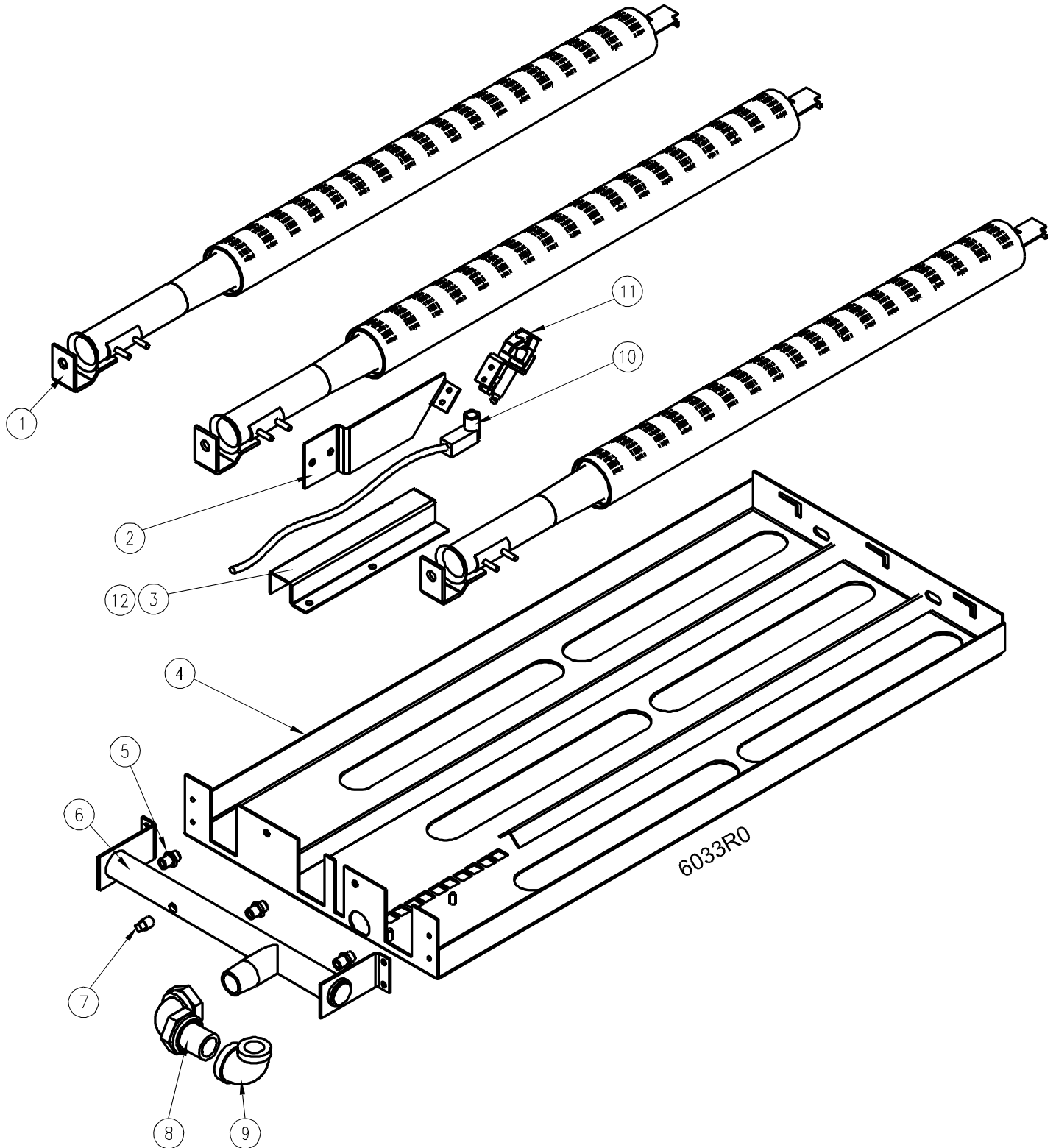
ITEM	PART NO.	DESCRIPTION	QUANTITY	
			80	100
33	--	Elbow 90°, Brass 1/4C x 1/4 FPT	1	1
34	--	Door Knob	1	1
35	--	Access Door Pivot Rod	1	1
36	--	Brass Pipe Nipple, 3/8 x 2 Lg.	1	1
37	--	Forged Tee, C.S. 3000 # 3/8 NPT	1	1
38	--	Connector, Brass, 1/4 C x 3/8 MPT	1	1
39	--	Black Pipe Close Nipple, 1/2 NPT	1	1
40	--	Black Pipe Nipple, 3/4 - SCH. 40 x 3-1/2" Lg.	1	1
41	--	Tee, Black Iron 150# 3/4 x 3/4 x 3/8 NPT	1	1
42	--	Street Elbow 90°, Black Iron 150 # 3/4" NPT	2	2
43	--	Extension, Relief Valve	1	1
44	--	Transformer, 120/24V, 50VA	1	1
* 45	43494	Faucet Bracket, Optional	1	1
* ** 46	40991	Transformer 240-120V, 100VA (220/240V Units)	1	1

* NOT SHOWN.

** SELECT AS REQUIRED

BURNER ASSEMBLY

80-100 GALLON MODELS



BURNER ASSEMBLY

80-100 GALLON MODELS

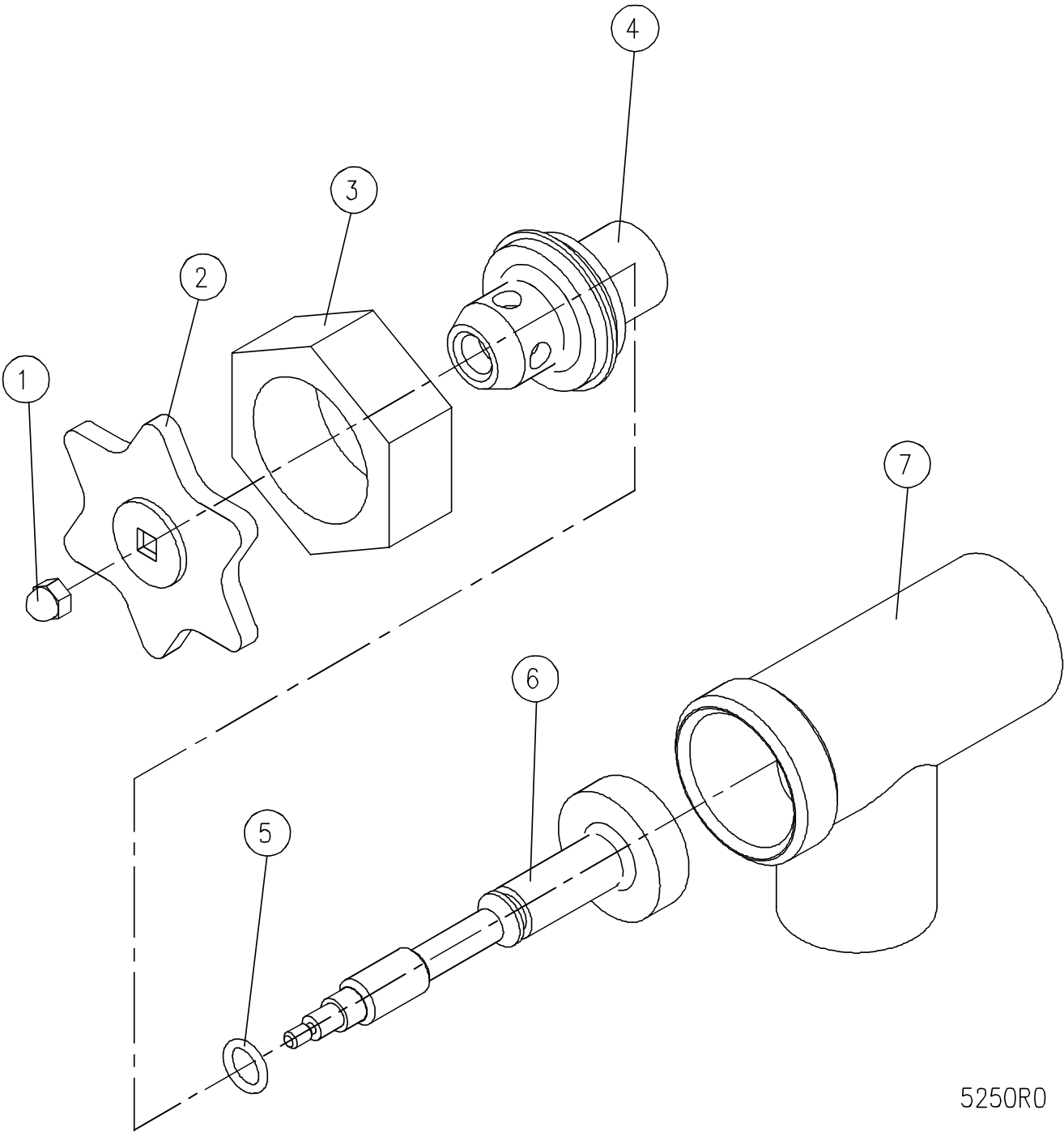
ITEM	PART NO.	DESCRIPTION	QUANTITY
	40322	Burner	3
2	--	Pilot Bracket	1
3	--	Cover, Igniter Wiring	1
4	43491	Burner Basket	1
5	40387	Orifice #45, L.P.	3
	40383	Orifice #30, Natural Gas	3
6	43492	Gas Manifold	1
7	41813	Sq. Hd. Pipe Plug 1/8 NPT	1
8	40617	Union Elbow, 3/4 NPT	1
9	41796	Reducing Elbow, #150, ½ NPT	1
10	43493	Igniter Cable	1
** 11	43331	Igniter/Sensor Pilot, Natural	1
	--	Igniter/Sensor Pilot, LP	1
* 12	--	Insulation, 1.00" x 7.450" x 1.50"	1

* NOT SHOWN

** SELECT AS REQUIRED.

DRAW OFF VALVES

ALL MODELS



5250R0

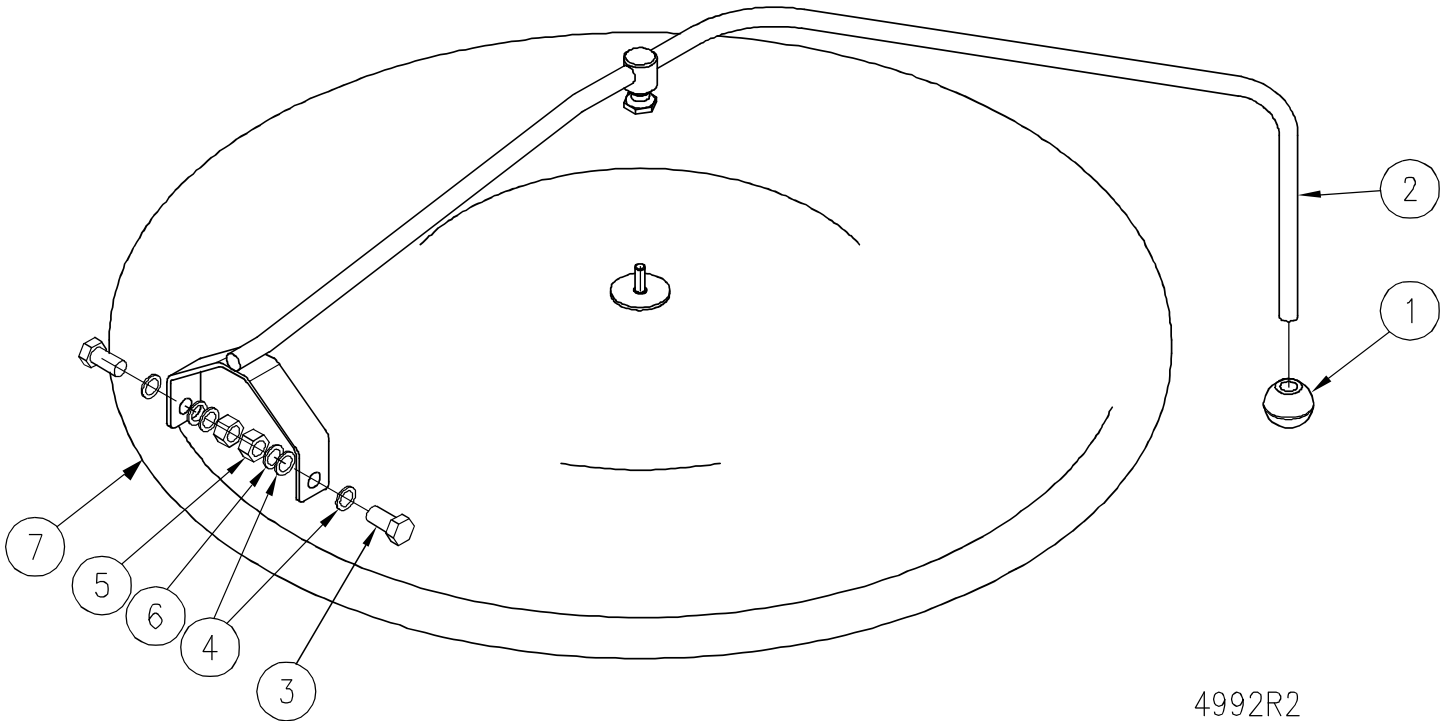
DRAW OFF VALVES

ALL MODELS

ITEM	PART NO.	DESCRIPTION	QUANTITY
	40553	1-1/2" DRAW-OFF VALVE ASSEMBLY	
1	41809	Acorn Nut 10-24 UNC	1
2	40662	Handle, Stainless Steel	1
3	40559	Gland Nut	1
4	40560	Bonnet	1
5	40562	"O" Ring	1
6	40561	Stem Assembly	1
7	43246	Valve Body	1
	40554	2" DRAW-OFF VALVE ASSEMBLY	
1	41809	Acorn Nut 10-24 UNC	1
2	40662	Handle, Stainless Steel	1
3	40563	Gland Nut	1
4	40564	Bonnet	1
5	40566	"O" Ring	1
6	40565	Stem Assembly	1
7	42481	Valve Body	1
	40556	3" DRAW-OFF VALVE ASSEMBLY	
1	40567	Acorn Nut, 7/16-14 UNC	1
2	40568	Handle, Stainless Steel	1
3	40569	Gland Nut	1
4	40570	Bonnet	1
5	40572	"O" Ring	1
6	40571	Stem Assembly	1
7	43248	Valve Body	1

HINGED COVER ASSEMBLY

20 - 60 GALLON MODELS

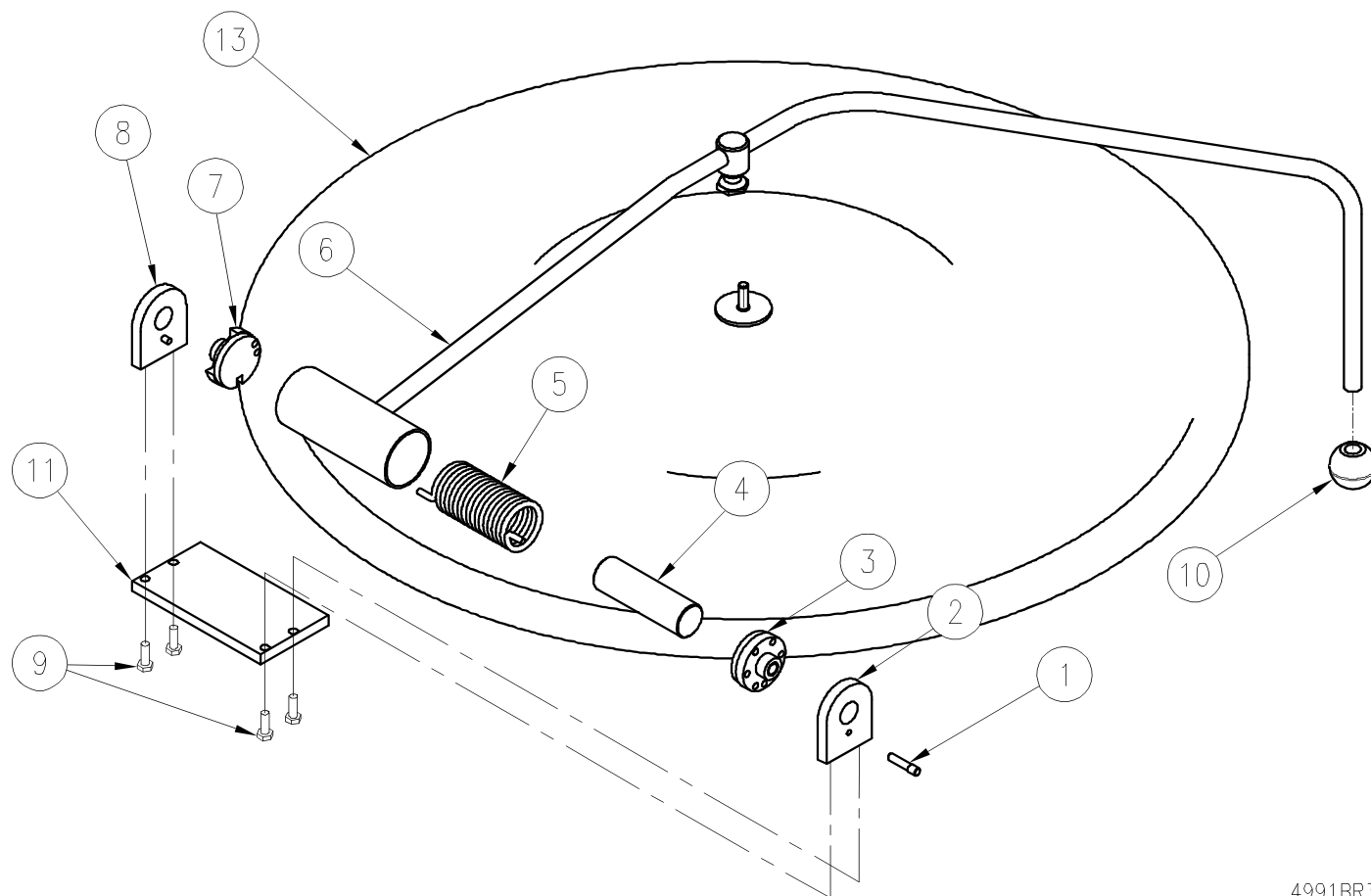


ITEM	PART NO.	DESCRIPTION	QUANTITY
	40259	Knob	1
** 2	42167	Handle Assembly, 20 Gallon Kettle	1
	42168	Handle Assembly, 30 or 40 Gallon Kettle	1
3	40109	Hex Bolt, 1/2 - 20 UNF x 1" S.S.	2
4	40133	Fibre Washer	4
5	40111	Hex Nut, 1/2 - 20 UNF, S.S.	2
6	--	Split Lock Washer, 1/2", S.S.	2
** 7	--	Cover, 20 Gallon Kettle	1
	--	Cover, 30 or 40 Gallon Kettle	1

** SELECT AS REQUIRED

COVER ASSEMBLY

20 - 60 GALLON MODELS



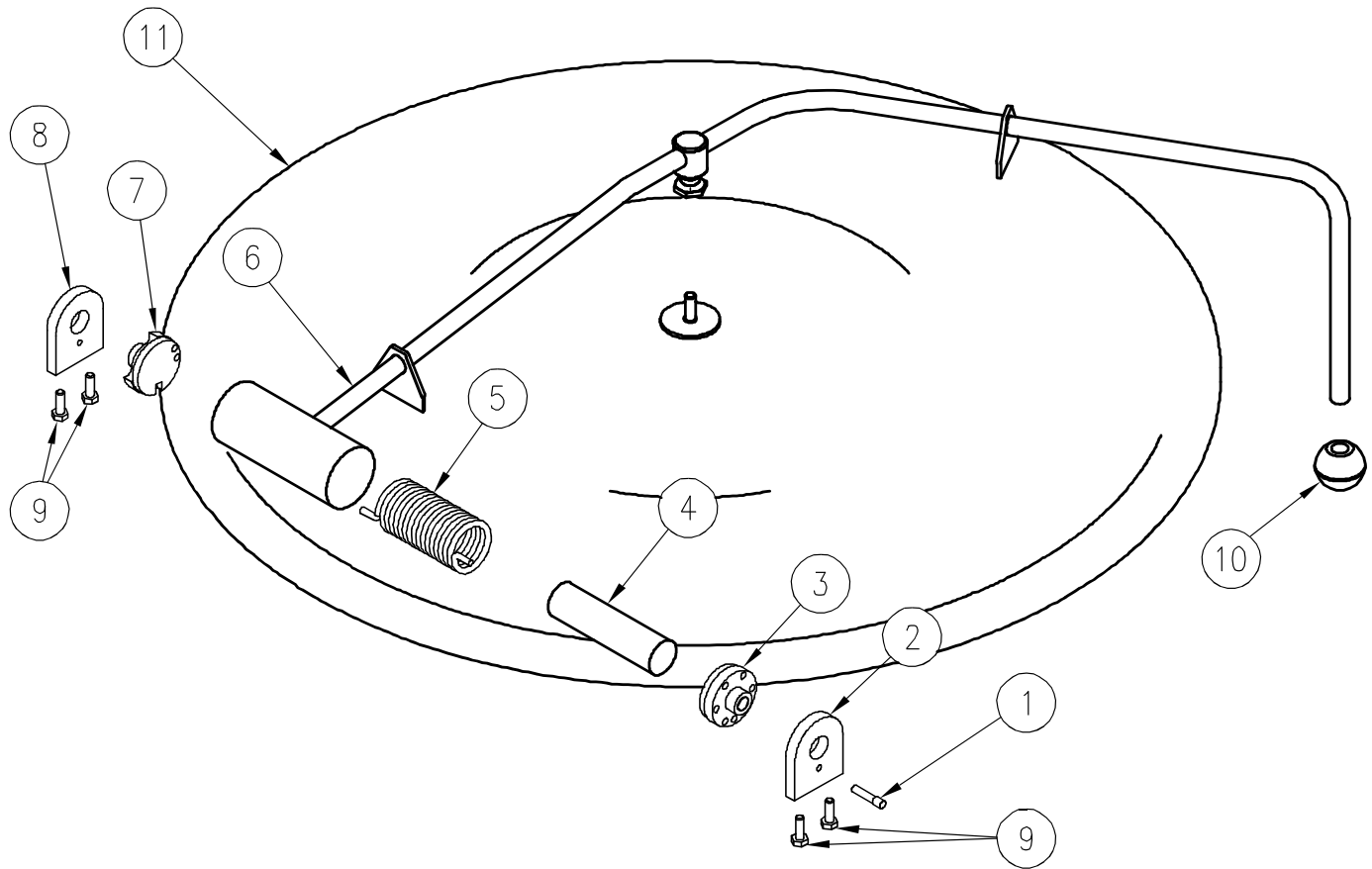
4991BR3

ITEM	PART NO.	DESCRIPTION	QUANTITY
	42112	HINGE ASSEMBLY	
1	41543	Lock Pin	1
2	41546	End Lock Plate	1
3	43106	Stationary Disc	1
4	41100	Core	1
5	41526	Spring	1
** 6	41540	Handle Assembly, 20 Gallon Kettle	1
	--	Handle Assembly, 30 Gallon Kettle	1
	41541	Handle Assembly, 40 Gallon Kettle	1
	41532	Handle Assembly, 60 Gallon Kettle	1
7	43107	Rotary Disc	1
8	41520	End Stop Plate	1
9	40098	Cap Screws, 1/4-20 x 3/4	4
10	40259	Knob	1
11	40462	Mounting Plate	1
**12	40017	Cover, 20 Gallon Kettle	1
	41514	Cover, 30 or 40 Gallon Kettle	1
	41515	Cover, 60 Gallon Kettle	1

** SELECT AS REQUIRED

COVER ASSEMBLY

80 - 100 GALLON MODELS



4991-3R0

ITEM	PART NO.	DESCRIPTION	QUANTITY
	42112	COVER ASSEMBLY	
1	41543	Lock Pin	1
2	41546	End Lock Plate	1
3	43106	Stationary Disc	1
4	41100	Core	1
5	41526	Spring	1
6	42464	Handle Assembly	1
7	43107	Rotary Disc	1
8	41520	End Stop Plate	1
9	40098	Cap Screws, 1/4 - 20 x 3/4, Stainless Steel	4
10	40259	Knob	1
	40462	Mounting Plate	1
11	42467	Cover	1

MATERIAL SAFETY DATA SHEET

PREPARATION INFORMATION:

Prepared for use in Canada by: E H & S Product Regulatory Management Department

DOW CHEMICAL CANADA INC.

P.O. Box 1012

Sarnia, Ontario, N7T 7K7

(800) 331-6451

CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

IN CASE OF EMERGENCY:

Fort Saskatchewan, Alberta: (780) 998-8282

Sarnia, Ontario: (519) 339-3711

Varenes, Quebec: (450) 652-1000

Product:..... DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 2/20/01

Date Printed: 07/10/02

MSD: 002239

DOW CHEMICAL CANADA INC.

P.O. Box 1012

Sarnia, Ontario, N7T 7K7

Prepared for use in Canada by the E H & S Product Regulatory Management Department; Phone: (800) 331-6451.

COMPOSITION/INFORMATION ON INGREDIENTS

Propylene Glycol	CAS # 000057-55-6	94%
Dipotassium Phosphate	CAS # 007758-11-4	<5%
Deionized Water	CAS # 007732-18-5	<5%

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear yellow liquid. Odourless. Avoid temperatures above 450°F, 232°C.

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Mists may cause eye irritation.

SKIN CONTACT: Prolonged contact is essentially nonirritating to skin. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Repeated exposures may cause flaking and softening of skin.

INGESTION: Single dose oral toxicity is considered to be extremely low. No hazards anticipated from swallowing small amounts incidental to normal handling operations.

INHALATION: At room temperature, vapours are minimal due to physical properties. Mists may cause irritation of upper respiratory tract (nose and throat).

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Repeated excessive exposure to propylene glycol may cause central nervous system effects.

CANCER INFORMATION: Did not cause cancer in laboratory animals.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus.

REPRODUCTIVE EFFECTS: In animal studies, has been shown not to interfere with reproduction.

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MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

FIRST AID

EYES: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower.

INGESTION: No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: 214°F, 107°C (based on a similar material)

METHOD USED: PMCC

AUTOIGNITION TEMPERATURE: Not determined.

FLAMMABILITY LIMITS

LFL: Not determined.

UFL: Not determined

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01 Date Printed: 07/10/02, MSD: 002239

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to carbon monoxide and carbon dioxide.

OTHER FLAMMABILITY INFORMATION: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Flammable concentrations of vapour can accumulate at temperatures above 214°F. Liquid mist of this product can burn. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Container may rupture from gas generation in a fire situation.

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream. May spread fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

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

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls/Personal Protection.

PROTECT THE ENVIRONMENT: Avoid contamination of all waterways.

CLEAN-UP: See Section 13, Disposal Consideration.

HANDLING AND STORAGE

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: No special handling requirements data available.

HANDLING: See Section 8, Exposure Controls/Personal Protection. STORAGE: See Section 10, Stability and Reactivity.

STORAGE: See Section 10, Stability and Reactivity.

EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Use safety glasses. Safety glasses should be sufficient for most operations; however, for misty operations wear chemical goggles.

SKIN PROTECTION: Use gloves impervious to this material.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. In misty atmospheres, use an approved mist respirator.

EXPOSURE GUIDELINES: Propylene glycol: AIHA WEEL is 50 ppm total, 10 mg/m³ aerosol only.

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE/PHYSICAL STATE: Clear yellow liquid.

ODOUR: Odourless

VAPOUR PRESSURE: 0.22 mmHg @ 20°C

VAPOUR DENSITY: 2.6

BOILING POINT: 320°F, 160°C

SOLUBILITY IN WATER/MISCIBILITY: Complete

SPECIFIC GRAVITY OR DENSITY: 1.058 @ 25/25°C

STABILITY AND REACTIVITY

CHEMICAL STABILITY: Thermally stable at typical use temperatures.

CONDITIONS TO AVOID: Avoid use temperatures above 450°F, 232°C. Product can degrade at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials. Avoid contact with strong acids

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply and the presence of other materials.

HAZARDOUS POLYMERIZATION: Will not occur.

TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1).

SKIN: The LD50 for skin absorption in rabbits is >10,000 mg/kg.

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

INGESTION: The oral LD50 for rats is 20,000 - 34,000 mg/kg.

MUTAGENICITY: In vitro mutagenicity studies were negative. Animal mutagenicity studies were negative.

ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1.)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based largely or completely on data for major component(s). Bioconcentration potential is low (BCF less than 100 or Log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50).

DEGRADATION AND PERSISTENCE: Based largely or completely on data for major component(s). Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Degradation is expected in the atmospheric environment within minutes to hours.

ECOTOXICITY: Based largely or completely on data for major component(s). Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50 >100 mg/L in most sensitive species).

DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods 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. THE DOW CHEMICAL COMPANY HAS 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 2 (Composition/Information On Ingredients).

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, **Date Printed:** 07/10/02, **MSD:** 002239

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436 or 989-832-1556 for further details.

TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.): For D.O.T. regulatory information, if required, consult transportation regulations, product shipping papers, or contact your Dow representative.

CANADIAN TDG INFORMATION: For TDG regulatory information, if required, consult transportation regulations, product shipping papers, or your Dow representative.

REGULATORY INFORMATION (Not meant to be all-inclusive – selected regulations represented).

NOTICE: The information herein is presented 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 from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

U.S. REGULATIONS

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category.

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
1, 2-Propanediol	000057-55-6	PA1

PA1= Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD: This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

MATERIAL SAFETY DATA SHEET

Product: DOWFROST™ HD HEAT TRANSFER FLUID, DYED

Product Code: 04632

Effective Date: 02/20/01, Date Printed: 07/10/02, MSD: 002239

CANADIAN REGULATIONS

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

This product is not a "Controlled Product" under WHMIS. CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

This product contains one or more substances which are not listed on the Canadian Domestic Substances List (DSL). Contact your Dow representative for more information.

OTHER INFORMATION

MSDS STATUS: Revised Section 8 (Exposure Guidelines).

The information herein is given in good faith, but no warranty, express or implied, is made. Consult The Dow Chemical Company for further information.