Weaver
CONSTRUCTION MANAGEMENT
3679 S Huron Street, Suite 404 Englewood, Colorado 80110
Phone: (303) 789-4111 FAX: (303) 789-4310

SUBMITTAL TRANSMITAL

April 3, 2012
Submittal No: 11312-001.A

PROJECT: **Harold Thompson Regional WRF**
Birdsall Rd.
Fountain, CO 80817
Job No. 2908

ENGINEER: **GMS, Inc.**
611 No. Weber St., #300
Colorado Springs, CO 80903
719-475-2935 Roger Sams

OWNER: **Lower Fountain Metropolitan Sewage Disposal District**
901 S. Santa Fe Ave.
Fountain, CO 80817
719-382-5303 James Heckman

CONTRACTOR: **Ambiente H2O Inc**.
1500 W Hampden Ave., STE 5D
Sheridan, CO 80110
303-433-0364 Jane Harlow/ Bill Pinkston

SUBJECT: Resubmittal for review comments for the RAS End Suction Pumps: 4" B5442

SPEC SECTION: 11312: End Suction Centrifugal Pumps

PREVIOUS SUBMISSION DATES: 1/30/12

DEVIATIONS FROM SPEC: ___ YES _X_ NO

CONTRACTOR'S STAMP: This submittal has been reviewed by Weaver Construction Management and, unless indicated otherwise, has been found to be in conformance with the intent of the contract documents.

Contractor's Stamp:	Engineer's Stamp:
Date: 4/3/12 Reviewed by: John Jacob ( ) Reviewed Without Comments (x) Reviewed With Comments	

ENGINEER'S COMMENTS:_____
_____

Project: HDTWRF Project

Location: Fountain, CO

Supplier: Ambiente Water

Date: 4/2/12

Submittal 11312-001.A RAS End Suction Pumps by Fairbanks Morse

WCM additional Submittal Review Comments:

1. **1.4 – 1.3.B.6.I The comments should have read " suitability for use with VFD's is not indicated for motors" not FVDs. Fairbanks response indicates that the motors are inverter duty type.**
2. **Based on the setting plan on drawing No. 095078SP it appears the WAS pumps shall have a counterclockwise rotation and a No. 15 discharge position. This is based on Sheet PD-15 dated 1/25/12. Both WCM and Ambiente agree with GMS's understanding of this setting plan requirement.**
3. **WCM acknowledges coordination of proper pipe connections and pump elevations.**
4. **On 'Fairbanks Morse Pump Corp General Clarifications' sheet, the last bullet item under #1 excludes field performance testing. The contract specifications require field testing and we request that Ambiente Water acknowledge this requirement.**

Fairbanks Morse
Pentair Water

Last printed 3/23/2012 10:25:00 AM

March 23, 2012

Ambiente H2O Inc.
1500 W Hampden Ave
STE 5D
Sheridan, CO 80110

Attn: Jane Harlow

Subject:	Purchase Order Number:	P110236-REV1
	Fairbanks Morse Project Number:	095077
	Project:	Harold D. Thompson Regional WRF Denver, Colorado

To Whom It May Concern:

Submittal data for the above order is attached. This submittal is for your review and approval prior to release for manufacturing.

We require submittal return with your review comments and/or approval to release within 35 days for production scheduling purposes. At time of release, please advise firm “on-site” requirement dates for this equipment.

Very Truly Yours,

Specifications Department
Pentair Pump Group

Return Submittal to: **Carolyn Crews**
Supervisor, Order Administration

cc: Selby

Enclosures: (1) sets submittal

Fairbanks Morse Pump Corporation
General Clarifications

1. The supply and installation of the following items are by others unless otherwise identified in this submittal.
   - Anchor bolts, nuts and washers
   - Gauges, valves and miscellaneous fittings and adapters.
   - Connecting piping and/or supports
   - Maintenance lubrication piping and related equipment.
   - System control apparatus
   - Maintenance tools and/or storage boxes.
   - Equipment tags.
   - Installation or field performance testing.
2. The following information is required by Fairbanks Morse prior to or at release of the pumps to production.
   - Verification of rotation and discharge position.
3. The following items are shipped loose for installation in the field:
   - Drivers and couplings

Fairbanks Morse Pump
Submittal Data For
Harold D Thompson Regional WRF
Denver, Colorado

Supplier:	Ambiente H2O Inc.
Manufacturer:	
Pump	Fairbanks Morse Pump 3601 Fairbanks Ave. Kansas City, Kansas 66106-0906 (913) 371-5000 Fax: (913) 371-2272
Order Number:	2478796
Quantity:	3
Pump Size & Model:	4” B5442 Vertical Close Coupled Non-Clog
Coupling:	Falk Corporation 3001 West Canal St. Milwaukee, WI 53208-4222 (414) 342-3131 Fax: (414) 937-4359
Motor:	U S Electrical Motors P. O. Box 3946 St. Louis, MO 63136 (314) 553-2000

Fairbanks Morse Pump
Table of Contents

Fairbanks Morse
Pentair Water

Response to Comments:

1.1. Per Spec paragraph 1.3, B., 4., b., the pump type is not indicated.

FM Response: The pump type is indicated in the revised submittal.

1.2. Per Spec paragraph 1.3, B., 4., j. and k., submittal page TDS440 indicates basic pump weight. Is that including or excluding frame and pedestal?

FM Response: The basic pump weight includes the frame and pedestal.

1.3. Per Spec paragraph 1.3, B., 4., 1., 1, the number of curves submitted is less than specified.

FM Response: Revised curves are included in the resubmittal.

1.4. Per Spec paragraph 1.3, B., 6., I, suitability for use with FVOs is not indicated for motors.

FM Response: Motor are inverter duty motors as stated on motor Accessory Data Sheet under Features. Please clarify for use with "FVOs".

2. Please verify whether the submitted equipment is intended to meet all operating conditions with a single impeller size, or two different sizes.

FM Response: Two sizes of impellers will be provided. Curves for each are included in the revised submittal.

3. The single pump performance curve submitted is not adequate to verify all operating conditions required for the RAS pumps. Please provide additional performance curves in order to verify compliance with both initial and design operating conditions. Please note Specification Section 11312, Paragraph 1.3.B.4.I.1, requires a minimum of five (5) variable speed performance curves for each of the operating conditions.

FM Response: Performance curves for both initial and design operating conditions are included in the resubmittal.

4. The setting plan, submittal drawing No. 095077SP, did not indicate the intended pump rotation or discharge position. Based on the information in this submittal drawing, it appears the RAS pumps should be provided with a counterclockwise rotation and a No. 15 discharge position. It is requested the Contractor and supplier verify these items with the project drawings.

FM Response: Contractor to verify.

5. The setting plan, submittal drawing No. 095077SP, includes several dimensions relative to the locations of the suction and discharge connections of the pumps. The contractor shall be responsible for coordinating these pump connection locations during pump installation to ensure that all elevations, dimensions and other requirements shown on the drawings are met for the associated pumps and piping.

FM Response: Contractor.

6. In general, we take no exception to the Chesterton Model 255 mechanical seal submitted for these pumps. However, the materials of construction have not been specified for the stationary faces, nor the rotary faces. Please indicate the intended materials.

   FM Response: The materials of construction are indicated in the resubmittal.

7. The Typical Seal Water Flush Schematics shown on submittal page MSP-1000 include both a Typical Deadhead Schematic and a Typical Flush Water Schematic. From both the Project Drawings and Specification Section 11312, it is intended that the Typical Flush Water Schematic be used for these RAS pumps. Please indicate this on submittal page MSP-1000.

   FM Response: The Typical Flush Water Schematic is indicated in the resubmittal.

8. A listing of spare parts to be furnished is provided on submittal page SP-5440. This spare parts list includes three impellers. However, the details of the spare part impellers are not provided. Refer to previous comment No. 2 regarding various impeller sizes. Please provide the details of the impellers intended to be provided as spare parts.

   FM Response: Details regarding the spare impellers are included in the resubmittal.

9. The Fairbanks Morse Pump Paint Specifications Data Sheet, submittal page PC-1000, indicates “factory standard” for the surface preparation, number of finish coats and dry film thickness of finish coats. However, the following Coatings Data Sheets do not appear to address these items. Please define “factory standard” for each of these items.

   FM Response: A revised Paint Specifications Data Sheet is included in the resubmittal.

10. Data sheets for the Sensata Technologies thermal protector for motors have been included in this submittal. However, the model number intended for use has not been indicated. Please specify the intended product.

    FM Response: The thermal protector part number is indicated in the resubmittal.

11. The electric motor paint specification included in this submittal indicates two possible primer products. First, specify the product intended for use on this project. Second, please provide technical data sheets for the intended product in order to verify its applicability.

    FM Response: The intended primer and its technical data sheet are included in the resubmittal.

- **Customer to Advise Rotation and Discharge Position**
- Solids Handling Pump
- Dynamic Balanced Cast Iron Impeller
- 300-350 BHN 416 Stainless Steel Impeller and Casing Wear Rings
- Stainless Steel Impeller Fastener
- 4 x 4 Suction Elbow
- Vertical Base
- 300-350 BHN Stainless Steel Shaft Sleeve
- Chesterton 255 Mechanical Seal
- Falk T10 Steelflex Coupling
- Variable Speed High Ring Base
- Variable Speed Operation
- Certified Non-Witness Performance Test
- Multiple Speed Test
- Certified Non-Witness Hydrostatic Test
- Lot of Spare Parts
- 15 HP, 1800 RPM, 3/60/230-460 V Motor

1. Refer also to clarifications that may be included on the vendor submittal.
2. The shutoff range will be 58 to 83 feet.

Fairbanks Morse
Pentair Water

4" B5442 SUBMITTAL CURVE

SPEED	IMPELLER	DIAMETER	STAGE
1775	T4B1A	7.00	1
SPHERE	DRIVER	DATE	BY
3"	15 HP	1/18/2012	DF

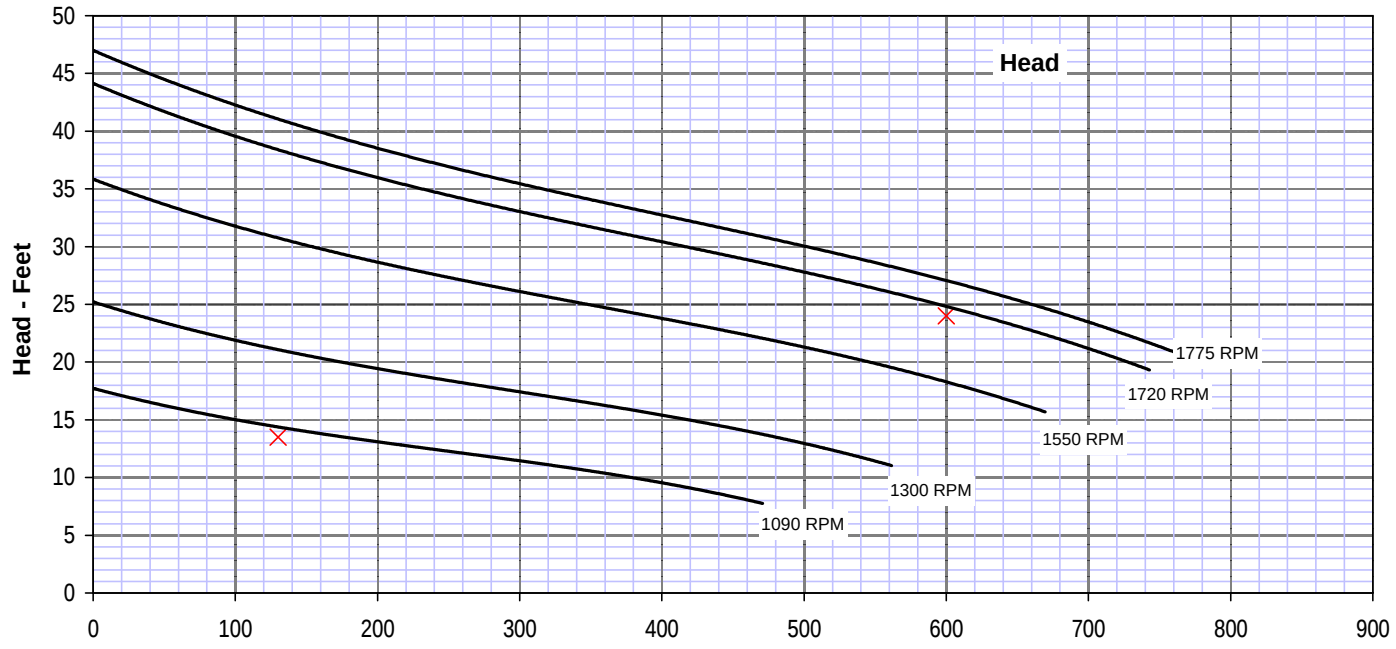
GUARANTEED VALUES			
FLOW	HEAD	% EFF	BHP
600	24		
130	13.5		

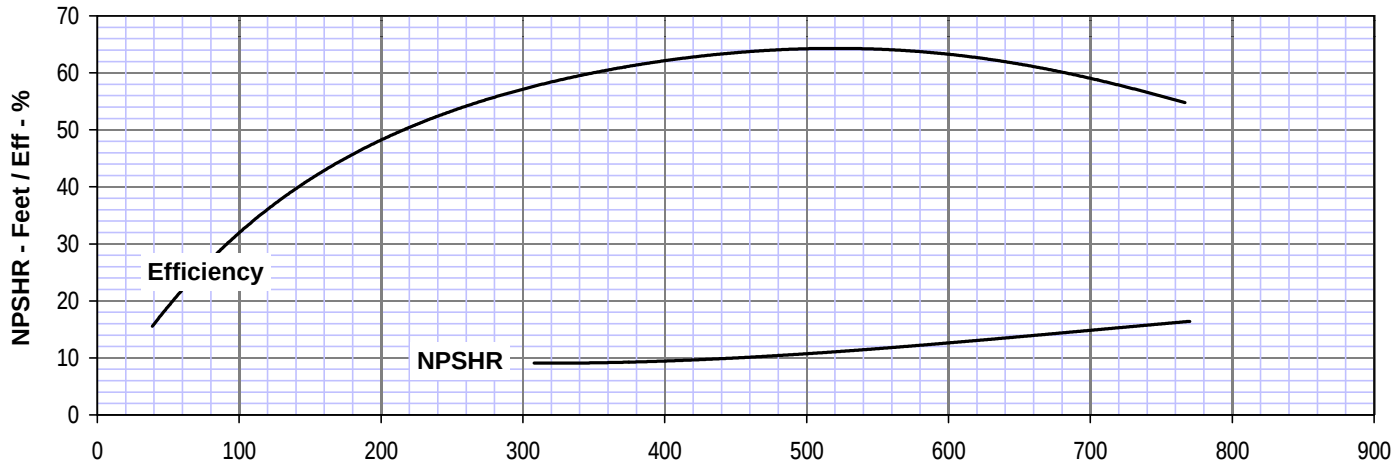
CURVE NO.:	095077	REV.:	2

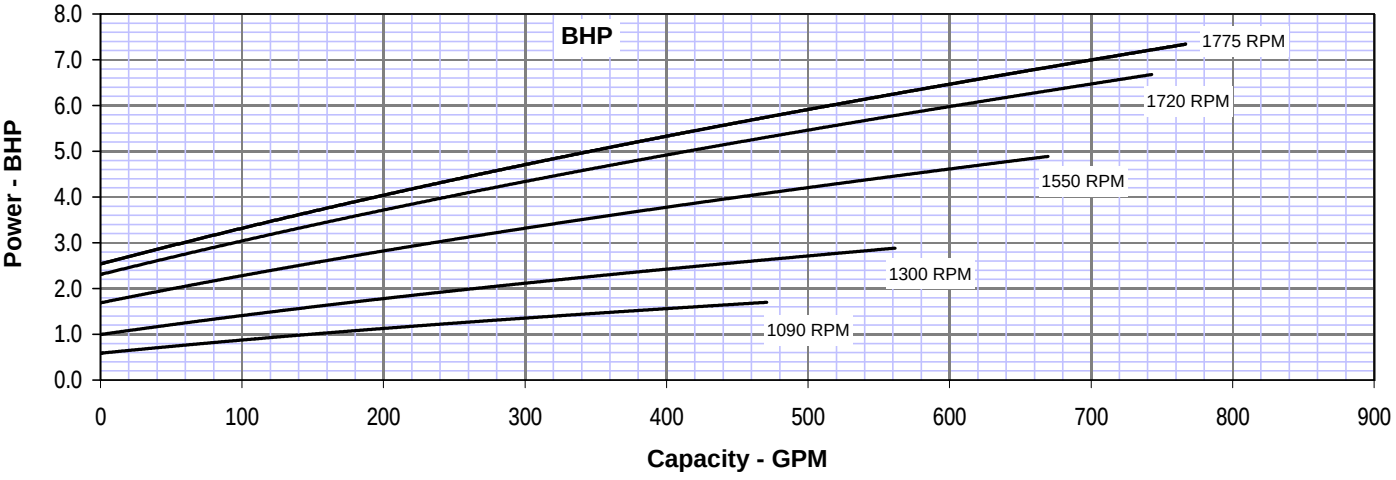
INITIAL CONDITIONS - CURVE "A"

THIS CURVE IS BASED ON THE ACTUAL TEST PERFORMANCE OF A SIMILAR PUMP. ONLY THE INDICATED POINT(S) IS GUARANTEED.

Ref:CRVMAC







Fairbanks Morse
Pentair Water

4" B5442 SUBMITTAL CURVE

SPEED	IMPELLER	DIAMETER	STAGE
1775	T4B1A	8.30	1
SPHERE	DRIVER	DATE	BY
3"	15 HP	12/9/2011	DF

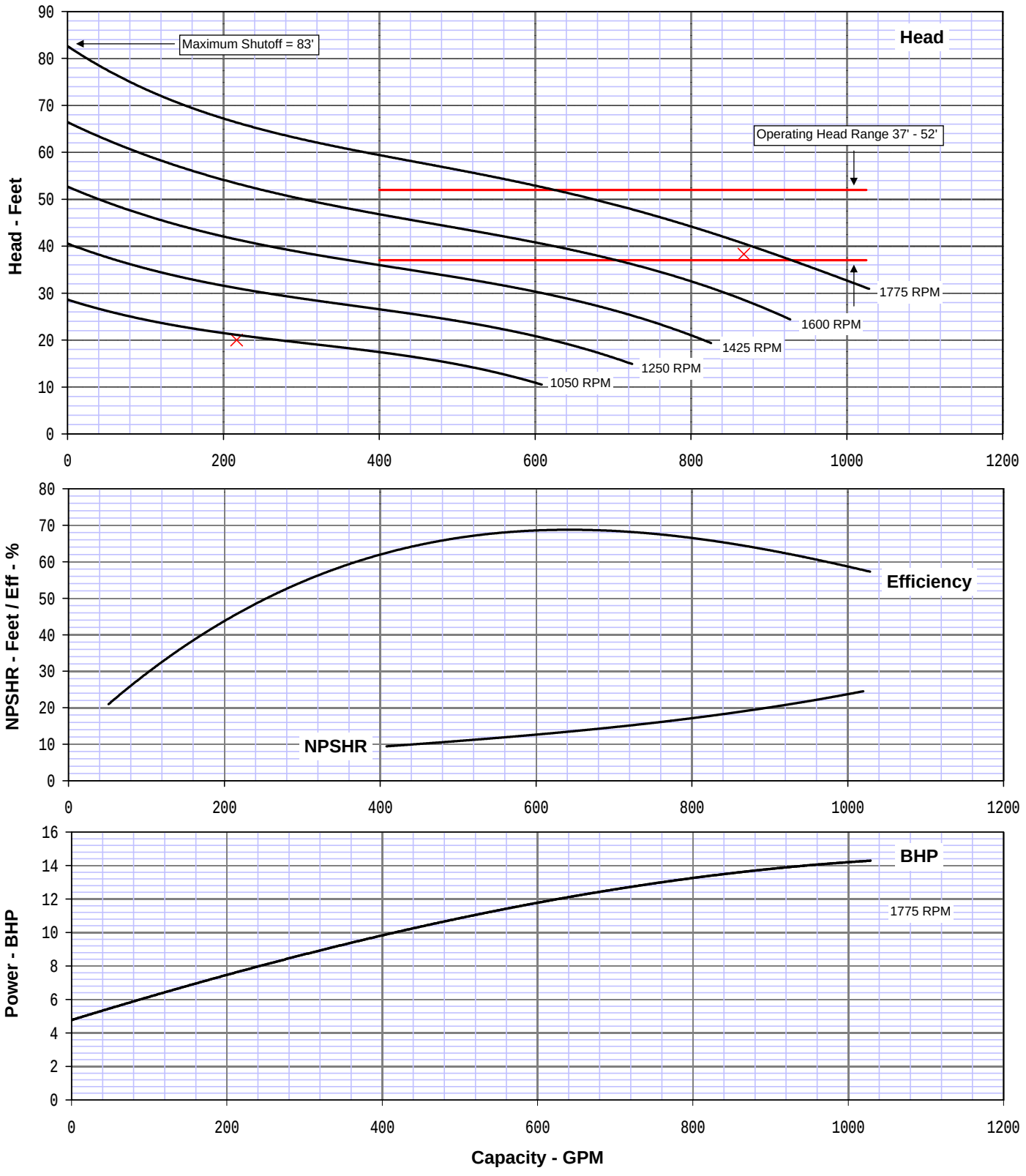
GUARANTEED VALUES			
FLOW	HEAD	% EFF	BHP
868	38.3		
217	20		

CURVE NO.:	095077	REV.:	4

FUTURE CONDITIONS - CURVE "B"

THIS CURVE IS BASED ON THE ACTUAL TEST PERFORMANCE OF A SIMILAR PUMP. ONLY THE INDICATED POINT(S) IS GUARANTEED.

Ref:CRVMAC



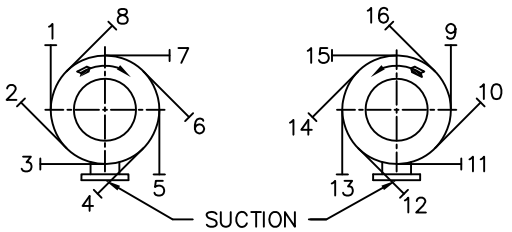
⚠ WARNING

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

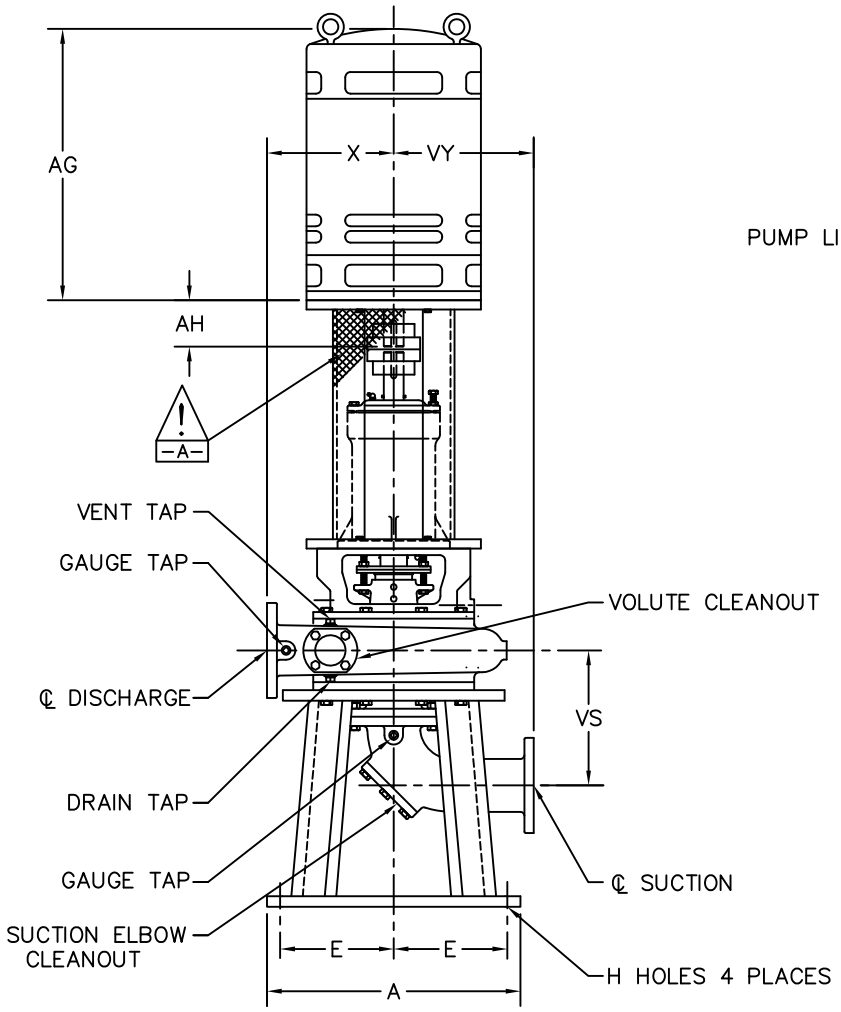
–A– SUPPLIED BY FMPC –B– SUPPLIED BY OTHERS

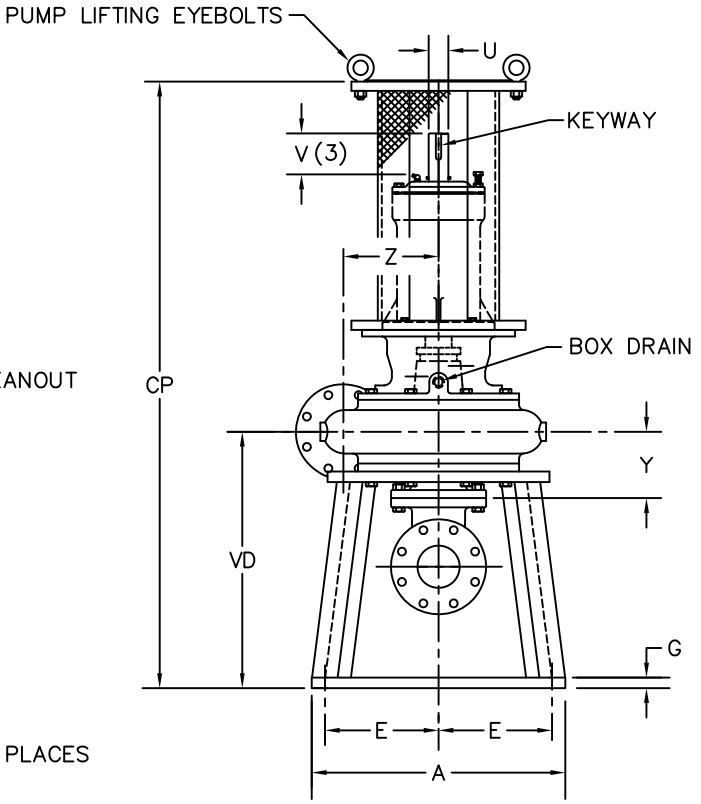
MOTOR DIMENSION	
AG	AH
24.63	2.75

AVAILABLE DISCHARGE POSITIONS



POSITIONS #1 OR #9 ARE STANDARD WHEN VIEWED FROM THE DRIVER END UNLESS OTHERWISE SPECIFIED. CLOCKWISE ROTATION DISCHARGE POSITION #1 SHOWN.





PUMP	FRAME	SUCT	DISCH	A	E	G	H	U	V	X	Y	Z	CP AH=2 3/4	CP AH=4 1/2	VD	VS	VY	KEYWAY
4" B5442	T20	4	4	20	8 1/4	3/4	1 1/8	1 3/8	2 1/4	10	5 1/4	7 7/8	43 5/8	45 3/8	17 3/8	11 3/4	13 1/4	5/16 X 5/32 X 2

** CUSTOMER TO ADVISE ROTATION AND DISCHARGE POSITION

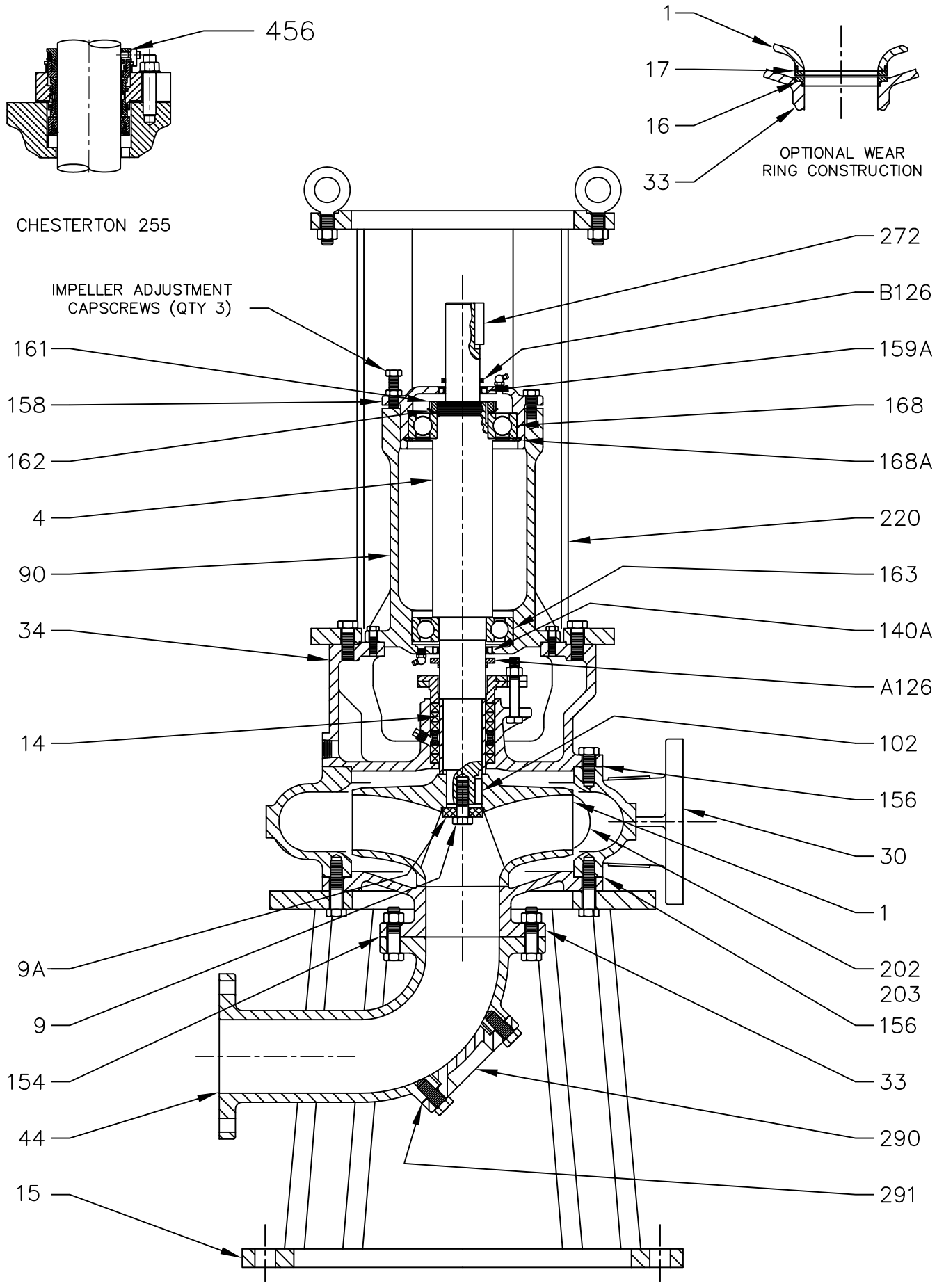
NOTES:
(1) ALL FLANGES ARE 125# ANSI DRILLING UNLESS NOTED.
(2) ALL DIMENSIONS ARE IN INCHES UNLESS NOTED.
(3) DIMENSIONS REFLECT USABLE SHAFT LENGTH.
(4) 5400'S AND 5400K'S ARE DIMENSIONALLY IDENTICAL.
(5) BASES ARE DESIGNED TO HAVE FULL CONTACT WITH GROUT OR A SOLE PLATE GROUTED IN PLACE.
(6) NOT FOR CONSTRUCTION, INSTALLATION, OR APPLICATION PURPOSES UNLESS CERTIFIED. DIMENSIONS SHOWN MAY VARY DUE TO NORMAL MANUFACTURING TOLERANCES.

CUSTOMER: AMBIENTE H2O INC					P.O. NO.: P110236–REV1	Fairbanks Morse PENTAIR PUMP GROUP
JOB NAME: HAROLD D. THOMPSON REGIONAL WRF					TAG NAME:	
PUMP SIZE AND MODEL: 4" B5442		GPM: 868	TDH: 38.3	RPM: 1760	ROTATION: **	DISCH POS: **
MOTOR: USEM	HP: 15	FRAME: 254VP	PHASE: 3	HERTZ: 60	VOLTS: 203–460	ENCLOSURE: TEFC
CERTIFIED FOR: PROJECT NO. 095077			CERTIFIED BY: TG		DATE: 12/19/2011	SETTING PLAN B5441 & B5442
					DWG NO: 095077SP	REV NO: 0

Fairbanks Morse Pump
Material Specifications

Item	Description	Material	Specification[1]
1	Impeller	Cast Iron	A48 Class 30
4	Shaft	Steel	AISI 4140 or AISI 1144[2]
9	Bolt, Impeller	Stainless Steel	A193 CL2 B8
9A	Washer, Impeller	Stainless Steel	A582 S41600
14	Sleeve, Shaft	Stainless Steel	A743 CA40 300-350 BHN
15	Base	Cast Iron	A48 Class 30
16	Wear Ring, Fronthead	Stainless Steel	A743 Gr. CA40 300-350 BHN
17	Wear Ring, Impeller	Stainless Steel	A743 Gr. CA40 300-350 BHN
30	Volute	Cast Iron	A48 Class 30
33	Fronthead	Cast Iron	A48 Class 30
34	Backhead	Cast Iron	A48 Class 30
44	Suction Elbow	Cast Iron	A48 Class 30
90	Frame	Cast Iron	A48 Class 30
A126	Deflector, Inner	Rubber	Commercial
B126	Deflector, Outer	Rubber	Commercial
102	Key, Impeller	Stainless Steel	A276 S30400
140A	Seal, Outer Grease	Steel & Rubber	Commercial
154	Gasket, Elbow	Tag Board	F104
156	Gasket, Volute	Tag Board	D1170-G3111
158	Housing, Thrust Bearing	Cast Iron	A48 Class 30
159A	Seal, Outer Grease	Steel & Rubber	Commercial
161	Locknut, Bearing	Steel	SAE Bolt Steel
162	Lockwasher, Bearing	Steel	AISI 1215
163	Bearing, Radial	Steel	Commercial
168	Bearing, Thrust	Steel	Commercial
168A	Snap Ring, Bearing	Steel	Commercial
202	Cover, Volute Cleanout	Cast Iron	A48 Class 30
203	Gasket, Cleanout	Rubber	Commercial
220	High Ring Base	Cast Iron/Steel	A48 Class 30 /A36 & A53
272	Key, Coupling	Steel	A108 Grade 1018
290	Cover, Suction Hand hole	Cast Iron	A48 Class 30
291	Gasket, Handhole	Rubber	Commercial
456	Mechanical Seal	Commercial	Commercial

[1] All material specifications are ASTM unless otherwise noted and are or description of chemistry only.
[2] Manufacturer's option.
[4] All dimensions are in inches unless otherwise noted.



ASSEMBLY
B5442 T20 FRAME

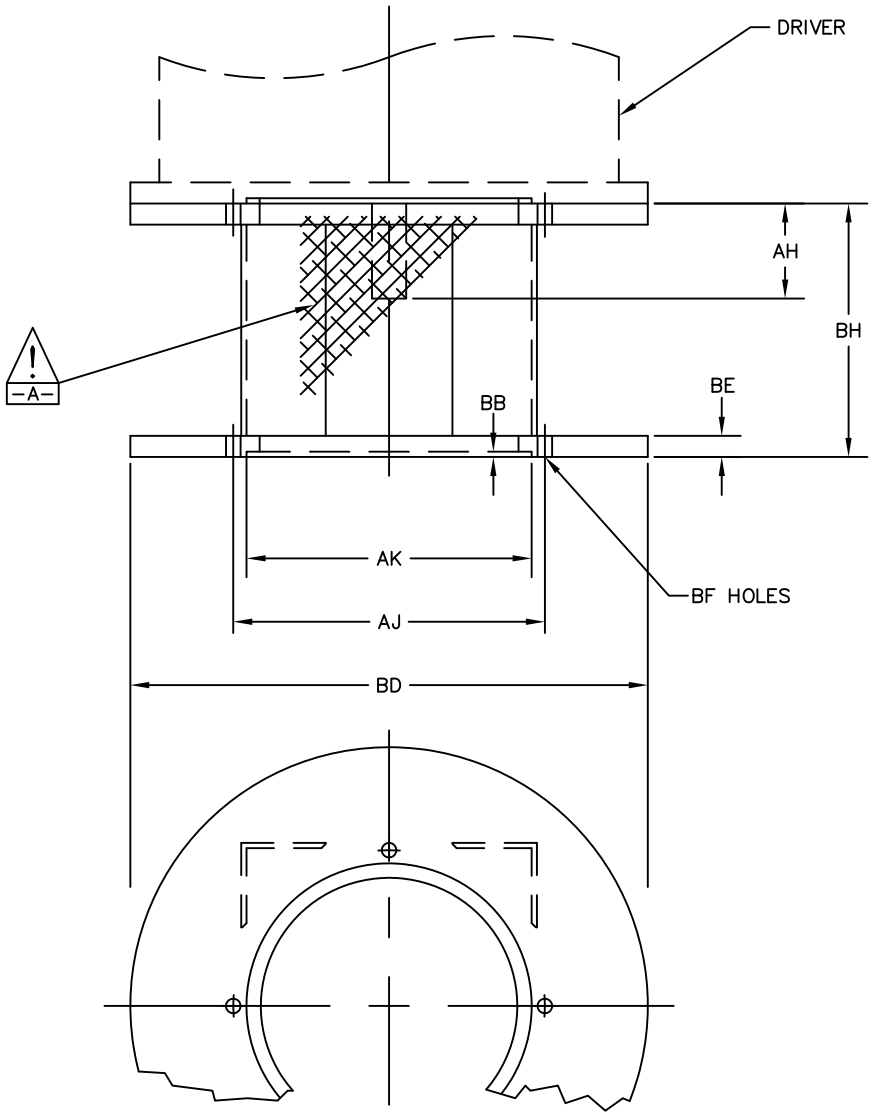
Fairbanks Morse
PENTAIR PUMP GROUP

DWG NO 5440A003 REV NO 0

⚠ WARNING

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

–A– SUPPLIED BY FMPC –B– SUPPLIED BY OTHERS



FLANGE SIZE	STANDARD HIGH RING BASE							
	BH	AJ	AK	BB	BD	BE	BF HOLES	AH
10	9	9 1/8	8 1/4	3/16	10	3/4	7/16	2.75

HIGH RING BASE DIMENSIONS FOR "P" FLANGE DRIVERS

Fairbanks Morse
PENTAIR PUMP GROUP

DWG NO 5410S017 REV NO 0

Pump[4]	
Frame Size	T20
Pump Size	4
Suction Size, Standard	4
Nominal Wear Ring Clearance	0.020
Impeller Fastener	
Size	1/2-13
Tightening Torque, lb.-ft.	80
Impeller	
Weight, lb.	41.2
Inlet Area, sq. In.	26.22
WK^2 Lb.-$Ft.^2$	2.8
Sphere Size, Maximum	3
Shaft Diameter:	
at Impeller	1 1/4
at Sleeve	1 1/2
at Thrust Bearing	1.969
at Radial Bearing	1.969
Between Bearings	2 3/8
at Coupling	1 3/8
Keyway at Coupling	5/16 X 5/32
Torsional Shaft Stiffness, lbs./rad.	$3.7X10^5$
Center to Center of Bearings	8 3/4
Thrust Bearing Number	6310
Radial Bearing Number	6310
Sealing Box:	
Mechanical Seal	
Type	Chesterton 255
Recommended Flush Water	
Pressure, PSI (above operating pressure)	1-10
Flow, GPM	1/2-1
Sleeve OD	1 7/8
Box ID	2 5/8
Box Depth	2 7/8
Box Inlet Tap Size, NPT	1/4
Box Outlet Tap Size, NPT	1/4
Backhead Drain Tap Size, NPT	3/4
Volute Cleanout Diameter	2 7/8
Suction Elbow Cleanout Diameter	4
Vent/Priming Tap Size, NPT	1/4
Gauge Tap Size	
Suction, NPT	1/2
Discharge, NPT	1/2
Hydrostatic Test Pressure, Maximum, PSI	90
Casing Working Pressure, Maximum, PSI	60
Nominal Casing Thickness	3/8
Operating Temperature, °F	150
Anchor Bolt Size Recommended	7/8
Minimum Diameter Opening to Install Pump	34
Shipping Weight, Basic Pump, lb.	490

Fairbanks Morse Pump
Typical Pump Bearing Lubricants

Fairbanks Morse Pump recommends a superior quality, NLGI No. 2, multipurpose, lithium complex grease for all pump rolling element bearing applications that require grease lubrication. The grease characteristics should include good high temperature performance, extreme pressure properties, water resistance, excellent oxidation stability, good rust protection and resistance to chemical breakdown. Fairbanks Morse Pump does not recommend grease with molybdenum disulfide (moly) additives. In addition to the characteristics listed above, the grease should meet the following specification.

Specifications

Consistency:	NLGI No. 2	
Dropping Point	ASTM D2265	>450° F
Base fluid viscosity		
SUS @ 100° F	700 to 1200	
SUS @ 212° F	70 to 100	
Rust Prevention	ASTM 1743	Pass
Water Washout	ASTM 1264	<4% @ 175° F
Four Ball EP Test	ASTM D2596	>40kg load wear
		>250kg weld point

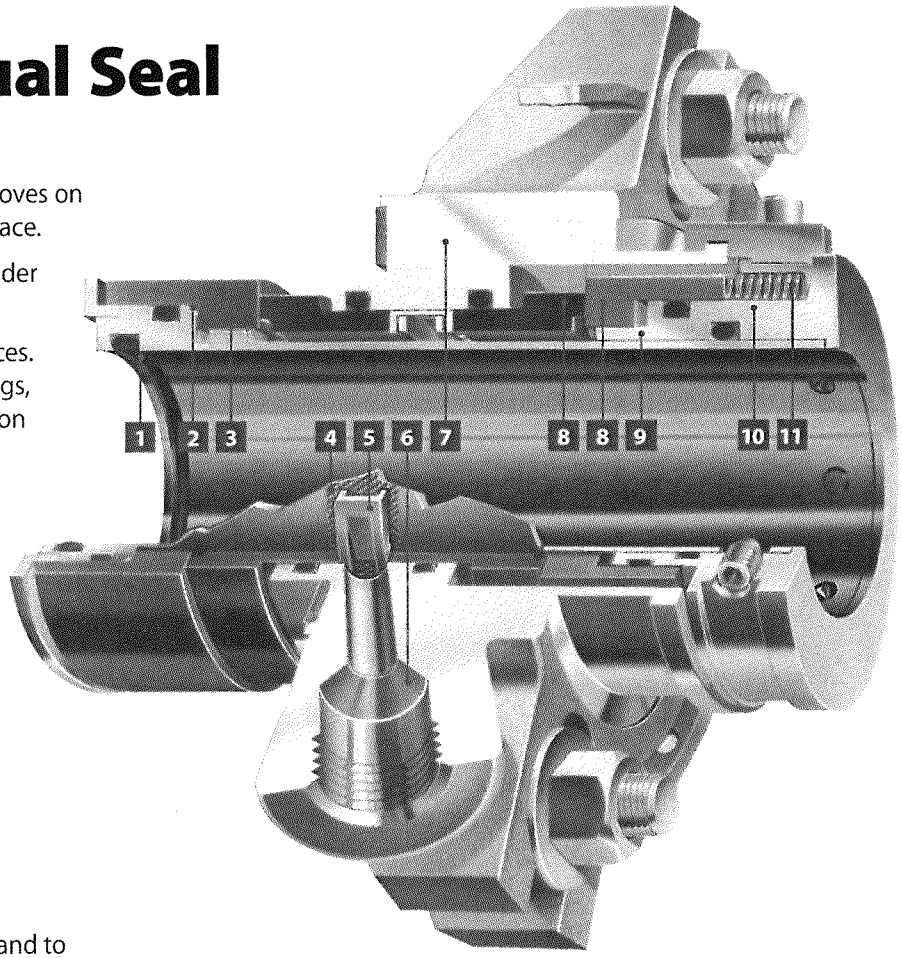
Fairbanks Morse Pump has compiled a general list of products that meet the grease requirements above. This list is not an endorsement of any particular manufacture and should not be construed as exclusive recommendations. When choosing an alternate manufacture, customers should discuss this typical lubricant recommendation with their vendor to ensure that equivalent grease is supplied.

Typical Products

Manufacturer	Lubricant Brand Name	NLGI No.
BP	BP Energrease® LC EP 2	2
Castrol	Pyroplex Red	2
Chevron	Delo® Greases EP	2
Exxon	Ronex® MP	2
Mobil	Mobiltith® AW2	2
Shell	Retinax® LC	2
Texaco	Starplex® 2	2
76	76 Multiplex EP	2

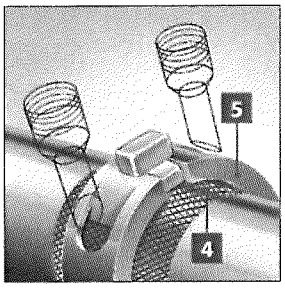
CHESTERTON®

255™ Cartridge Dual Seal



Construction Details

1. Every O-ring is either static or moves on a non-fretting, non-metallic surface.
2. Precision seal ring support shoulder maintains rotary alignment.
3. Inboard rotary and stationary faces. Dynamic stress-relieving seal rings, mated over a narrow cross-section for low heat generation.



4. Profiled sleeve provides positive pumping of barrier fluid.
5. Patented shuttle slides within gland to decouple faces from gland misalignment, channel barrier fluid, and provide anti-rotation for stationary seal rings.
6. Barrier fluid ports provide high capacity cooling.
7. Universal gland fits majority of pumps. ANSI oversize and API glands available.
8. Outboard stationary and rotary faces, identical to inboard set for simple assembly, low replacement inventory.
9. Inboard and outboard integral drive pads cannot loosen or fall out.
10. Patented Self-Centering Lock Ring™ for superior concentricity.
11. Revolutionary Unified Seal Alignment™ requires only one set of springs to provide constant loading of all four faces. Springs are isolated from process and barrier fluids.

Built for the future of emissions control
The Chesterton 255 seal is designed to meet environmental regulations for emissions control.

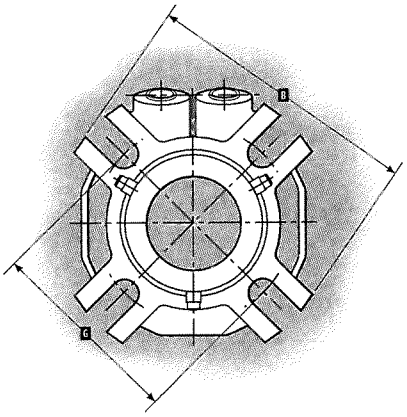
Advanced technology for applications flexibility
The exclusive design of the 255 enables it to operate in double-mode (barrier fluid pressure higher than stuffing box pressure) or tandem-mode (barrier fluid pressure lower than stuffing box pressure).

Staying cool in operation and under pressure
The 255 handles 50% to 100% more pressure than typical seals, providing users with a "margin of safety" at start-up and shut-down when transient surges often occur. The 255 features an internal positive barrier fluid pumping system with wide flow channels for efficient removal of heat. To test the 255's cool running, the 255 and a widely used competitive double seal were run under identical conditions with repeated shutoffs. ***Test conditions:*** 1.875" (48 mm) shaft, water barrier fluid room temperature, 1750 RPM, closed convection system. ***Results:*** 255 ran cool and steady while the conventional seal overheated and flashed.

CHESTERTON®

255 STANDARD – Dimensional Data/Inch

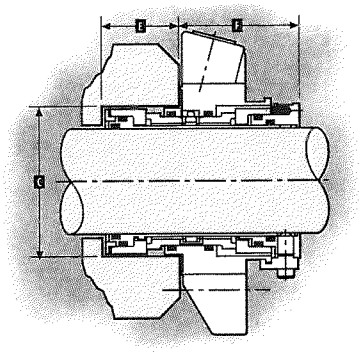
SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	3/8"	G/MIN 1/2"	5/8"
1.000	4.12	1.75	1.81	1.36	2.16	2.81	2.94	–
1.125	4.12	1.88	1.94	1.36	2.16	2.95	3.08	–
1.250	4.12	2.00	2.06	1.36	2.16	3.08	3.21	–
1.375	4.37	2.13	2.31	1.36	2.16	3.21	3.34	–
1.500	4.50	2.25	2.44	1.36	2.16	3.33	3.46	–
1.625	5.00	2.38	2.56	1.36	2.16	3.45	3.58	–
1.750	5.50	2.50	2.81	1.36	2.16	3.66	3.79	–
1.875	5.50	2.63	2.94	1.36	2.16	3.78	3.91	–
2.000	5.50	2.75	3.19	1.36	2.16	4.03	4.16	–
2.125	6.01	2.88	3.44	1.36	2.16	4.29	4.42	4.54
2.250	6.01	3.00	3.56	1.36	2.16	4.41	4.54	4.66
2.375	6.01	3.13	3.59	1.36	2.16	4.44	4.57	4.69
2.500	6.51	3.25	3.81	1.36	2.16	4.66	4.79	4.91



255 – Standard Version

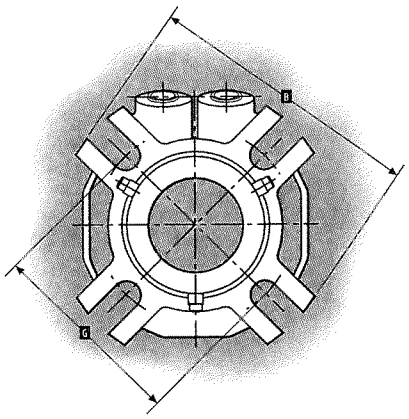
255 STANDARD – Dimensional Data/Metric

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	8 mm	G/MIN 10 mm	12 mm
25	105	44	46	35	55	70	72	74
28	105	47	49	35	55	73	75	77
30	105	49	51	35	55	76	78	80
32	105	51	52	35	55	77	79	81
33	114	54	58	35	55	78	80	82
35	111	54	59	35	55	80	82	84
38	114	57	62	35	55	83	85	87
40	127	59	61	35	55	86	88	90
43	127	64	69	35	55	89	91	93
45	140	64	66	35	55	93	95	97
48	140	69	74	35	55	94	96	98
50	140	69	71	35	55	98	100	102
55	153	74	76	35	55	–	103	105
60	153	79	85	35	55	–	113	115



255 ADAPTER VERSION – Dimensional Data/Inch

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	3/8"	G/MIN 1/2"	5/8"
1.000	4.12	1.75	1.81	1.18	2.35	2.81	2.94	–
1.125	4.12	1.88	1.94	1.18	2.35	2.95	3.08	–
1.250	4.12	2.00	2.06	1.18	2.35	3.08	3.21	–
1.375	4.37	2.13	2.31	1.18	2.35	3.21	3.34	–
1.500	4.50	2.25	2.44	1.18	2.35	3.33	3.46	–
1.625	5.00	2.38	2.56	1.18	2.35	3.45	3.58	–
1.750	5.50	2.50	2.81	1.18	2.35	3.66	3.79	–
1.875	5.50	2.63	2.94	1.18	2.35	3.78	3.91	–
2.000	5.50	2.75	3.19	1.18	2.35	4.03	4.16	–
2.125	6.01	2.88	3.44	1.18	2.35	4.29	4.42	4.55
2.250	6.01	3.00	3.56	1.18	2.35	4.41	4.54	4.67
2.375	6.01	3.13	3.59	1.18	2.35	4.44	4.57	4.70
2.500	6.51	3.25	3.81	1.18	2.35	4.66	4.79	4.92



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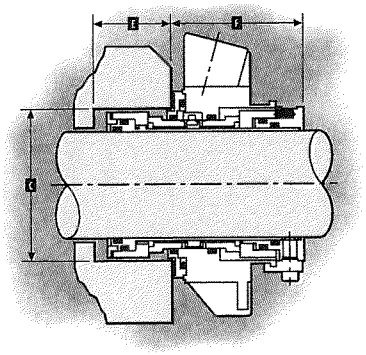
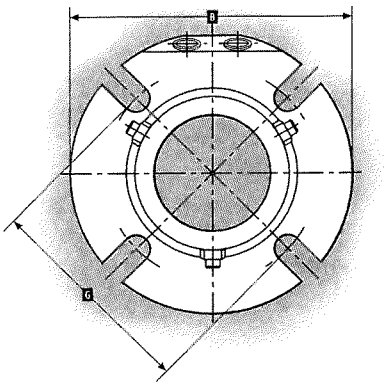


255 LARGE – Dimensional Data/Inch

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	3/8"	G/MIN 1/2"	5/8"
2.625	6.45	3.63	3.69	1.64	2.52	5.02	5.15	–
2.750	7.71	3.75	4.19	1.64	2.52	5.42	5.55	–
2.875	7.83	3.88	4.32	1.64	2.52	5.50	5.63	–
3.000	7.94	4.00	4.44	1.64	2.52	5.65	5.78	–
3.125	7.99	4.13	4.57	1.64	2.52	5.80	5.93	–
3.250	8.19	4.25	4.69	1.64	2.52	5.93	6.06	–
3.375	8.31	4.38	4.82	1.64	2.52	6.00	6.13	6.26
3.500	8.44	4.50	4.94	1.64	2.52	6.16	6.29	6.42
3.625	8.49	4.63	5.07	1.64	2.52	6.29	6.42	6.55
3.750	8.72	4.75	5.19	1.64	2.52	6.36	6.49	6.62
3.875	8.84	4.88	5.32	1.64	2.52	6.50	6.63	6.76
4.000	8.96	5.00	5.44	1.64	2.52	6.64	6.77	6.90
4.125	8.99	5.13	5.57	1.64	2.52	6.76	6.89	7.02
4.250	8.99	5.25	5.69	1.64	2.52	6.89	7.02	7.15
4.375	9.34	5.38	5.82	1.64	2.52	7.01	7.14	7.27
4.500	9.49	5.50	5.94	1.64	2.52	7.16	7.29	7.42
4.625	9.49	5.63	6.07	1.64	2.52	7.26	7.39	7.52
4.750	10.49	5.75	6.19	1.64	2.52	7.38	7.51	7.64



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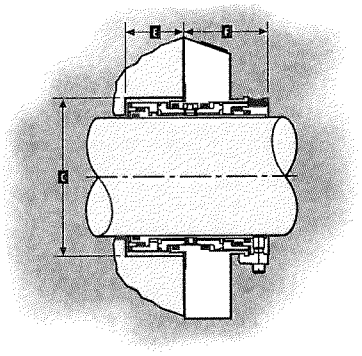
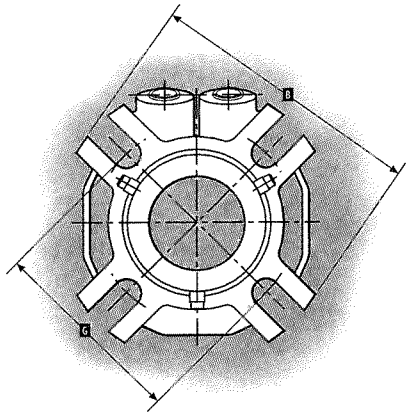


255 LARGE – Dimensional Data/Metric

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	12 mm	G/MIN 16 mm	20 mm
65	164	92	93	42	64	127	131	–
70	196	95	105	42	64	137	141	–
75	202	102	112	42	64	143	147	–
80	203	105	115	42	64	147	151	–
85	211	111	121	42	64	152	156	160
90	214	114	124	42	64	156	160	164
95	221	121	131	42	64	161	165	169
100	228	127	137	42	64	168	172	176
110	237	137	147	42	64	177	181	185
120	266	146	156	42	64	187	191	195

255 OVERSIZE – Dimensional Data/Inch

SHAFT SIZE	GLAND OD	STUFFING BOX BORE		SB DEPTH	OB LENGTH	BOLT CIRCLE BY BOLT SIZE		
	B MAX	C MIN	C MAX	E MIN	F	3/8"	G/MIN 1/2"	5/8"
1.125	4.49	2.63	2.94	1.48	1.98	3.77	–	–
1.375	5.40	2.82	2.99	1.48	1.98	4.02	–	–
1.750	6.64	3.51	3.74	1.30	2.16	5.21	5.34	5.46
1.875	5.99	3.57	3.80	1.30	2.16	–	4.94	–
2.125	6.99	3.89	4.24	1.30	2.16	–	–	5.89
2.500	7.77	4.51	4.74	1.30	2.16	–	–	6.70



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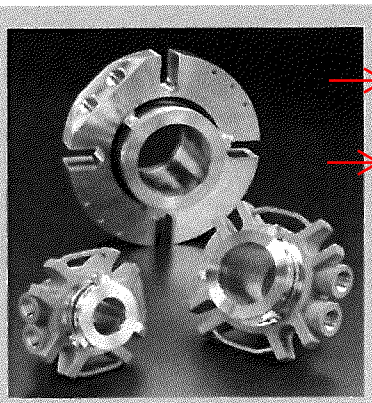


STANDARD MATERIALS**

Rotary Faces:
- Silicon Carbide
- Tungsten Carbide

Stationary Faces:
- Duplex Carbide™
- Carbon
- Silicon Carbide
- Tungsten Carbide

All Metal Parts:
- 316SS

Springs:
- Hastelloy C*

O-Rings:
- Fluorocarbon or AFLAS† installed; EPR included

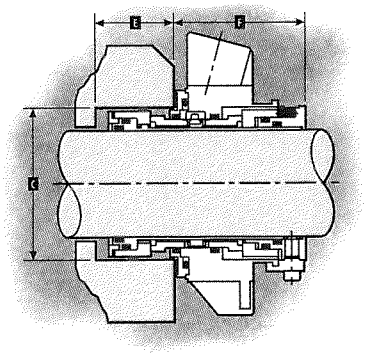
OPERATING LIMITS

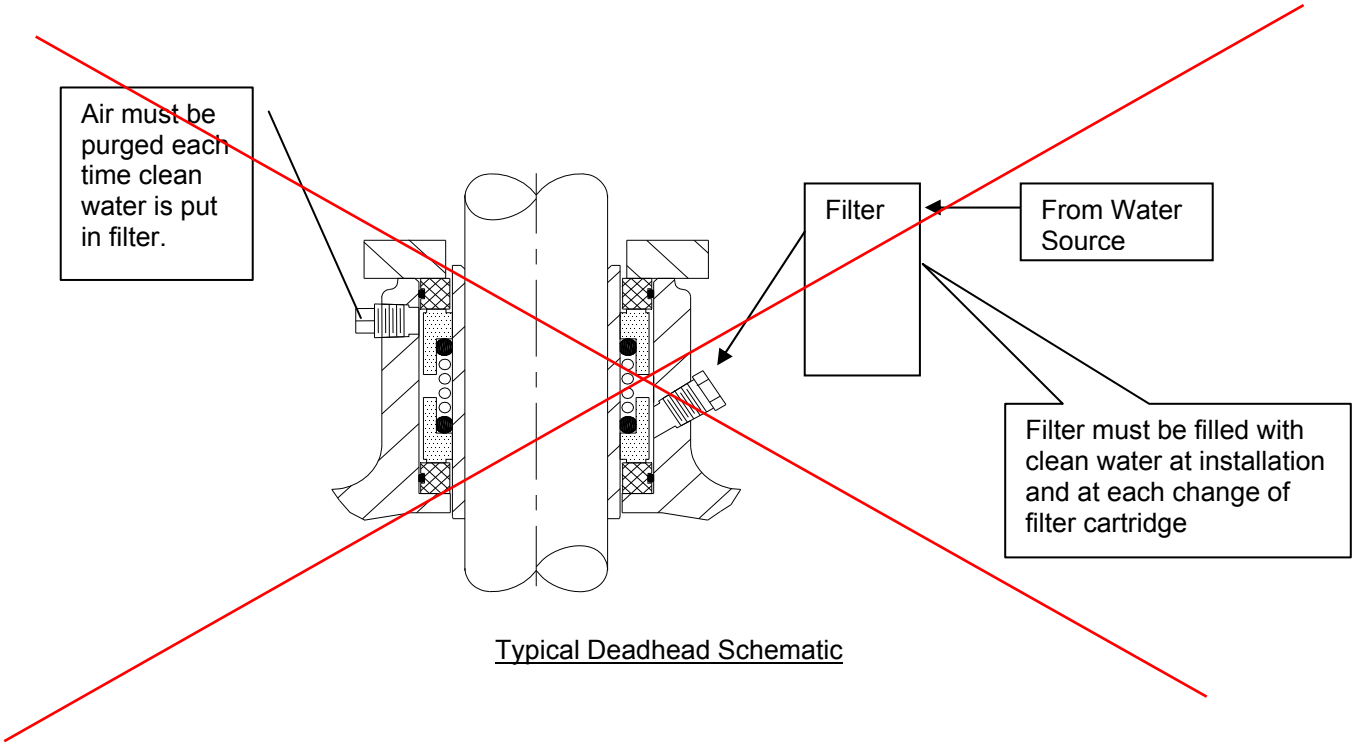
Speed Limits:
- To 4000 fpm (20 mps)

Temperature Limits:
- To 300°F (150°C) Ethylene Propylene
- To 400°F (205°C) Fluorocarbon, AFLAS
- To 500°F (260°C) Perfluoroelastomer

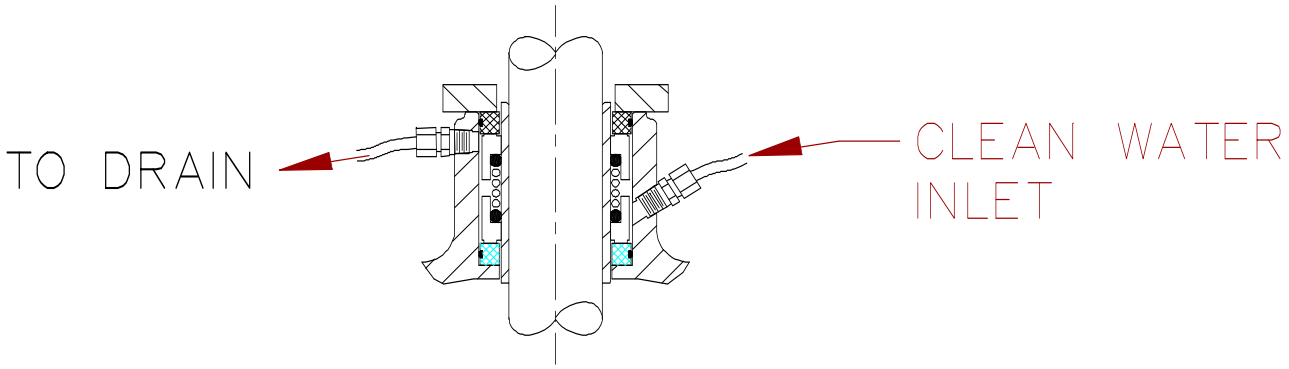
Pressure Limits:
- To 600°F (40 bar) inboard
- To 250°F (17 bar) outboard

* Haynes International, Inc Registered Trademark.
** Other materials available upon request.
*** 155T Sizes.
† Asahi Glass Company Ltd. Registered Trademark.





Typical Deadhead Schematic



Typical Flush Water Schematic

Fairbanks Morse Pump
Furnished Spare Parts

Ref. No.	Description	Quantity
1	Impeller – Trimmed for Future Conditions	3
456	Mechanical Seal	2
16, 17	Set Wear Rings	2
--	Set Bearings	2

- **Coating Manufacturer** Davis Industrial Coatings
- **Surface Preparation** SSPC-SP6
- **Finish Coat** Modified Alkyd Enamel
  - **Number of Coats** 1
  - **Color** Real Blue
  - **Dry Film Thickness** 1 to 1.5 Mils
  - **Surfaces to be coated** Exterior of Pump & High Ring Base

P.O. BOX 7589
1311 IRON STREET
KANSAS CITY, MISSOURI 64116
(816) 471-4447

DAVIS INDUSTRIAL COATINGS

HIGH SOLIDS FAST DRY ENAMEL
L/F REAL BLUE
4-3373

DESCRIPTION:
High Solids Fast Dry Enamel is a modified alkyd enamel for general industrial finishing of farm machinery, tanks, electrical equipment, heavy duty equipment and a variety of other products that require a high performance coating. Fast Dry Enamel exhibits excellent color and gloss retention, flexibility, hardness and corrosion resistance.

Weight Gallon:	9.92 ± 0.2 lb/gal
Weight Solids:	64.8 ± 2%
Volume Solids:	50.8 ± 2%
Coverage:	
@ 1 Dry Mil:	814 sq. ft./gallon
@ Spread Rate:	400 sq. ft./gallon (4.0 mils wet) Deposits a 2.0 mil dry film
VOC:	418 g/l; 3.49 lb/gal
Viscosity:	40-50" #4 Ford Cup @ 77°F
Gloss @ 60:	90+
Grind (Hegman):	#7
DOT Class:	Flammable, Flash Point 45°F, Paint UN1263
Federal Specification:	N/A
HMIS/NFPA:	2,3,0
Cure Time (Based on 70° F. & 50% R.H.):	
To Touch:	30 minutes
To Recoat:	0-1 hours, or after 96 hours
Recommended Thinner:	Butyl acetate for cleanup and reduction to spray
Temperature Resistance:	Continuous 150° F., Intermittent 200° F.

WARNING! FLAMMABLE! FOR INDUSTRIAL USE ONLY! Keep away from heat and open flame. Avoid prolonged contact with skin and breathing of vapor or spray mist. Do not take internally. Close container after each use. Use only with adequate ventilation. Use respiratory devices and other personal protective equipment required by OSHA 29CFR 1910. KEEP OUT OF REACH OF CHILDREN. For specific safety requirements, refer to the Material Safety Data Sheet.

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DAVIS INDUSTRIAL COATINGS

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DESCRIPTION:

High Solids Fast Dry Enamel is a modified alkyd enamel for general industrial finishing of farm machinery, tanks, electrical equipment, heavy duty equipment and a variety of other products that require a high performance coating. Fast Dry Enamel exhibits excellent color and gloss retention, flexibility, hardness and corrosion resistance.

SPECIAL CAUTIONS:

Do not apply Fast Dry Enamel when surface, air or material temperature is below 40°F. Surface must be dry and at least 5°F above the dew point.

SURFACE PREPARATION:

GENERAL - Surfaces to be finished must be clean, dry and free of dirt, oil or any contamination that would adversely affect adhesion, protective properties or appearance of the coating. Abrasive blasting is an effective method of cleaning steel surfaces and removing mill scale, rust and previous coatings. A 2 to 3 mil profile is recommended.

IRON, STEEL AND FERROUS METAL - For optimum adhesion and corrosion resistance, metal should be cleaned and phosphate treated or primed with Davis Fast Dry Metal Primer.

ALUMINUM & GALVANIZED METAL - For optimum adhesion chemically etch or prime with Vinyl Wash Primer.

PREVIOUSLY FINISHED SURFACES - Scaling and peeling paint must be removed by wirebrushing, sanding or scraping. Rusting metal should be cleaned and spot primed with Fast Dry Primer.

MIXING & THINNING:

Stir each container thoroughly prior to use. Material is packaged at a viscosity requiring little or no reduction for application by airless spray equipment. For conventional air spray, air-assist airless, dip or turbo will generally require a 25% reduction (4 parts paint to 1 part solvent by volume) with aromatic solvent.

Solvents of choice are toluol, xylol, SC-100 and SC-150. For cool weather conditions (below 65°F) use toluol. For normal temperatures (65-80°F) use xylol. For temperatures above 80°F, xylol may still be used, but SC-100 or SC-150 can be used as a retarder solvent to reduce dry spray and increase flow and leveling. Limit the level of SC-150 to 5% as a retarder solvent. Never use solvents such as VM&P naphtha, mineral spirits or reclaimed thinner. THIS PRODUCT MAY BE THINNED WITH KETONE, ESTER OR ALCOHOL SOLVENTS THAT ARE SARA TITLE 313 EXEMPT. Addition of solvent will increase VOC.

To store partially used container, pour a small amount of the recommended thinner over the surface. Do not stir. Replace lid securely. Store away from heat or open flame. Mix thoroughly before reusing.

Fast Dry Enamel may also be catalyzed with Davis Urethane Catalyst to create a hard, solvent and chemical resistant finish that is free from "after tack". Mix 16 parts paint to one part Urethane Catalyst (4-9062) by volume. Use within a two hour time period. Due to short potlife, never leave catalyzed paint in spray equipment. Clean immediately! Do not spray catalyzed material with heated spray equipment.

CLEAN UP:

Use xylol, aromatic solvent or MEK for cleaning guns and equipment.

APPLICATION:

Material can be applied by conventional air, air-assist airless, airless, dip or more advanced application equipment such as turbo disk or bell. This product may also be applied with electrostatic and/or heated equipment. Not recommended for brush or roller application over large areas. Small touchup areas may be brushed. Use the following recommendations as an application guide:

CONVENTIONAL AIR SPRAY:

Air Cap	66PF
Fluid Nozzle	63
Needle	63
Air Pressure	50-60 psi
Fluid Pressure	10-20 psi
Viscosity	18-26" #2 Zahn

AIR ASSIST-AIRLESS SPRAY:

Tip	0.009-0.013"
Fluid Pressure	300-600 psi
Air Pressure	10-25 psi
Pump/tip Filter	100 Mesh
Viscosity	20-30" #2 Zahn

AIRLESS SPRAY:

Tip	0.011-0.015"
Fan	50° (10-12 inch fan)
Pressure	1200-1800 psi
Pump/tip Filter	100 Mesh
Viscosity	25-60" #2 Zahn

For dip, flowcoat or turbo application, use the viscosity range 20-35" #2 Zahn as a starting point. On hot spray applications, material it is recommended to stay in the 90-140°F range.

APPLICATION RATE:

In most cases, an application over a primed or phosphated surface will provide adequate durability. Application rate will vary widely depending on texture, configuration and porosity of surfaces on which coating is applied. Approximately 350-400 square feet per gallon on smooth surfaces (32 to 37 square meters per 3.785 liters). Rough or porous surfaces will require more paint.

Approximate dry mil thickness of 1.3 mils at recommended application rate of 400 square feet per gallon on smooth surface. A dry film thickness of 1.0-1.5 mils is recommended

DRYING:

Optimum drying conditions are 60°F to 90°F (16°C to 32°C) at 50% R.H. Lower temperatures and high humidity will slow dry. Surface must be dry and at least 5°F above the dew point.

Dry to Touch	15-30 Minutes
To Recoat	Between 0-1 hours or after 96 hours

Product may also be force cured to enhance dry. Temperatures in the range of 110-180°F may be utilized to accelerate solvent evaporation and speed oxidation.

WARNING! FLAMMABLE! FOR INDUSTRIAL USE ONLY! Keep away from heat and open flame. Avoid prolonged contact with skin and breathing of vapor or spray mist. Do not take internally. Close container after each use. Use only with adequate ventilation. Use respiratory devices and other personal protective equipment required by OSHA 29CFR 1910. KEEP OUT OF REACH OF CHILDREN. For specific safety requirements, refer to the Material Safety Data Sheet.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: 4-3373 H/S F/D ENAMEL REAL BLUE HMIS CODES: H F R P
PRODUCT CODE: 000000000000043373 2 3 0

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: DAVIS PAINT COMPANY
ADDRESS : 1311 IRON STREET
P.O. BOX 7589
N. KANSAS CITY, MO 64116
EMERGENCY PHONE : (816)-471-4447 DATE PRINTED : 01/12/96
INFORMATION PHONE : (816)-471-4447 NAME OF PREPARER : Sandy Haskins

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT - CONTACT CHEMTREC PHONE: (800)-424-9300

SECTION II - INGREDIENTS/SARA III INFORMATION

REPORTABLE COMPONENTS	CAS NUMBER	VAPOR PRESSURE mm Hg @ TEMP		WEIGHT PERCENT
METHYL PROPYL KETONE (2-Pentanone)	107-87-9	27.8	68	25% - 30%
OSHA TWA: 200 PPM, ACGIH TLV: 200 PPM, DAVIS(REC): 705 mg/m3				
CALCIUM CARBONATE (Total Dust)	1317-65-3	0	68	25% - 30%
OSHA TWA: 15 mg/m3, ACGIH TLV: 10 mg/m3, DAVIS(REC): 5 mg/m3				
* METHYL ISOBUTYL KETONE (MIBK) (Hexone)	108-10-1	15	68	5
OSHA TWA: 50 PPM, ACGIH TLV: 50 PPM, DAVIS(REC): 205 mg/m3				

* Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.
This material may contain ingredients covered by the California "Safe Drinking Water and Toxic Enforcement Act of 1986".

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING RANGE: 214 deg F - 237 deg F SPECIFIC GRAVITY (H2O=1): 1.19
VAPOR DENSITY: LIGHTER THAN AIR EVAPORATION RATE: SLOWER THAN ETHER
COATING V.O.C.: 3.48 lb/gl, 417 g/l
MATERIAL V.O.C.: 3.48 lb/gl, 417 g/l
SOLUBILITY IN WATER: Negligible
APPEARANCE AND ODOR: Liquid, aromatic odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (TCC): 46 deg F
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER: 1 UPPER: 7.5

EXTINGUISHING MEDIA: FOAM, CO2, DRY CHEMICAL

SPECIAL FIREFIGHTING PROCEDURES

Full protective equipment and self contained breathing apparatus should be used. Water spray may be ineffective. Water may be used to cool closed containers to prevent pressure build-up and possible auto-ignition or explosion from heating.

UNUSUAL FIRE AND EXPLOSION HAZARDS

H e as an ignitable liquid. Keep containers tightly closed and isolate from heat, electrical equipment, sparks or flame. Vapors fo n explosive mixture in air between the upper and lower explosive limits. Never use welding or cutting torch on or near drum (ev empty) because product (even just residue) can ignite explosively. Avoid spontaneous combustion of soiled rags, steel wool, spray booth filters, spray residues and other waste material contaminated with this product by immediately immersing them in a sealed, water-filled metal container prior to disposal.

========== SECTION V - REACTIVITY DATA ==========

STABILITY: STABLE

CONDITIONS TO AVOID

Excessive heat, all possible sources of ignition, poor ventilation, corrosive atmospheres, excessive aging.

INCOMPATIBILITY (MATERIALS TO AVOID)

Alkaline materials, strong acids and oxidizing materials. If this product is not water reducible, avoid water.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS

Thermal decomposition or combustion can produce fumes containing organic acids, carbon dioxide and carbon monoxide.

HAZARDOUS POLYMERIZATION:

Will not occur under normal conditions

========== SECTION VI - HEALTH HAZARD DATA ==========

INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Solvent vapor or mist can cause dizziness, breathing difficulty, headaches, irritation to nose and throat, loss of coordination. Continued over-exposure can lead to central nervous system depression.

SKIN AND EYE CONTACT HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Eye Contact: Liquid or vapor can cause irritation, tearing, discomfort, redness and blurred vison. Skin Contact: Can cause irritation. Can cause defatting of skin which can lead to dermatitus.

N ABSORPTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

can be absorbed through skin causing irritation, defatting and dermatitus.

INGESTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE

Can cause mouth, throat, esophagus and stomach irritation, nausea, vomiting and diarrhea.

HEALTH HAZARDS (ACUTE AND CHRONIC)

Reports have associated repeated or prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

CARCINOGENICITY: NTP CARCINOGEN: No IARC MONOGRAPHS: No OSHA REGULATED: No

N/A

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

Preexisting eye, skin, liver, kidney and respiratory disorders.

EMERGENCY AND FIRST AID PROCEDURES

Inhalation- Move person to fresh air. If breathing stops, apply artificial respiration and seek medical attention. Eye contact- Flush immediately with a large amount of water for at least 15 minutes and get medical attention. Skin contact- Wash thoroughly wit soap and water while removing contaminated clothing and shoes. Ingestion- Do not induce vomiting! Contact physician or your local poison control center immediately.

Missouri Poison Control Center: 1-800-366-8888; Kansas Poison Control Center: 1-800-332-6633.

========== SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE ==========

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

ate all sources of ignition (flames, hot surfaces, and electrical, static, or frictional sparks). Avoid breathing vapors. Ven...ate area. Contain and remove with inert absorbent and non-sparking tools. Keep out of sewers.

WASTE DISPOSAL METHOD

C· ·ct absorbent/spilled liquid into metal containers. Dispose of in accordance with local, state and federal regulations. Do not i. ·rate closed containers. Incinerate in approved facility. Obey relevent laws.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep away from excessive heat, sparks or open flames. Keep containers closed when not in use. Store in cool, well ventilated approved areas. Avoid free fall of liquid in excess of a few inches and ground container when pouring. Use non-sparking utensils when handling this material. Keep containers closed and upright when not in use.

OTHER PRECAUTIONS

Do not take internally. Store large quantities in buildings designed to comply with OSHA 1910.106. Emptied containers may retain hazardous residue and explosive vapors. Keep away from heat, sparks and flames. Do not cut, puncture or weld on or near emptied containers. Wash hands after using and before smoking or eating. Follow all hazard precautions given in this data sheet until container is thoroughly cleaned or destroyed. KEEP OUT OF THE REACH OF CHILDREN. Avoid spontaneous combustion of soiled rags, steel wool, spray booth filters, spray residues and other material contaminated with this product by immediately immersing them in a sealed, water-filled metal container prior to disposal.

========== SECTION VIII - CONTROL MEASURES ==========

RESPIRATORY PROTECTION

Do not breathe vapors or spray mist. Wear an appropriate, properly fitted respirator (NIOSH/MSHA approved) during the use of this product until vapor and mists are exhausted, unless air monitoring demonstrates vapor and mist levels are below applicable exposure limits. Observe OSHA Standard 29CFR 1910.134.

VENTILATION

Provide general clean air dilution or local exhaust ventilation in volume and pattern to keep the air contaminant concentration below the lower explosion limit and applicable exposure limits. Refer to OSHA Standard 29 CFR 1910.94.

P· ·ECTIVE GLOVES

Use chemical/solvent impermeable gloves to avoid contact with product.

EYE PROTECTION

Avoid contact with eyes. Use safety eyewear with splash guards or side shields, chemical goggles, face shields.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT

Provide eyewash station and emergency shower. Use of protective creams, head caps, etc. is recommended. Avoid contact with contaminated clothing. Wash contaminated clothing, including shoes, before reuse.

WORK/HYGIENIC PRACTICES

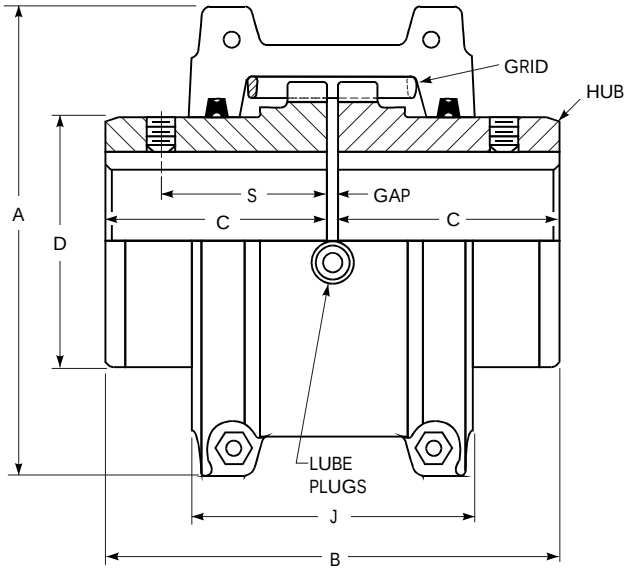
Wash hands before eating or using washroom, smoke in smoking areas only.

========== SECTION IX - DISCLAIMER ==========

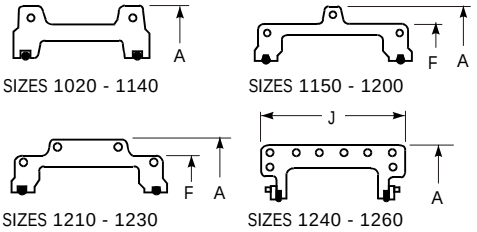
To the best of our knowledge, the information contained herein is based on data considered accurate. No warranty expressed or implied is made. Davis Paint assumes no responsibility for damage to person, property or business caused by the material. It is the responsibility of the purchaser or user of the material to ensure that it is properly used.

Type T10

Close Coupled/Dimensions — Inches



COVER PROFILES – HORIZONTAL SPLIT



Sizes 1020 thru 1230T10 covers are cast aluminum alloy; Sizes 1240 thru 1260T10 are fabricated steel.

SIZE ★	Torque Rating (lb-in) †	Allow Speed rpm ‡	Max Bore ●	Min Bore ■	Cplg Wt With No Bore-lb	Lube Wt lb	DIMENSIONS — INCHES							
							A	B	C	D	F	J	S	Gap
1020T	460	4500	1.125	.500	4.2	.06	3.82	3.88	1.88	1.56	....	2.62	1.54	.125
1030T	1,320	4500	1.375	.500	5.7	.09	4.16	3.88	1.88	1.94	....	2.69	1.54	.125
1040T	2,200	4500	1.625	.500	7.4	.12	4.50	4.12	2.00	2.25	....	2.75	1.58	.125
1050T	3,850	4500	1.875	.750	12	.15	5.32	4.88	2.38	2.62	....	3.12	1.76	.125
1060T	6,050	4350	2.125	.750	16	.19	5.82	5.12	2.50	3.00	....	3.62	2.06	.125
1070T	8,800	4125	2.500	1.062	23	.25	6.25	6.12	3.00	3.44	....	3.75	2.12	.125
1080T	18,150	3600	3.000	1.062	39	.38	7.50	7.12	3.50	4.12	....	4.56	2.54	.125
1090T	33,000	3600	3.500	1.625	56	.56	8.31	7.88	3.88	4.88	....	4.81	2.82	.125
1100T	55,550	2440	4.000	1.625	93	.94	9.88	9.69	4.75	5.59	....	6.12	....	.188
1110T	82,500	2250	4.500	2.375	120	1.12	10.62	10.19	5.00	6.31	....	6.36	....	.188
1120T	121,000	2025	5.000	2.625	179	1.62	12.12	12.00	5.88	7.06	....	7.54	....	.250
1130T	176,000	1800	6.000	2.625	266	2.0	13.62	13.00	6.38	8.56	....	7.68	....	.250
1140T	253,000	1650	7.250	4.250	392	2.5	15.12	14.75	7.25	10.00	....	7.92	....	.250
1150T	352,000	1500	8.000	4.750	500	4.3	17.84	14.65	7.20	10.60	15.40	10.68	....	.250
1160T	495,000	1350	9.000	5.250	681	6.2	19.76	15.85	7.80	12.00	17.20	10.96	....	.250
1170T	660,000	1225	10.000	6.000	987	7.7	22.32	17.25	8.50	14.00	19.18	12.10	....	.250
1180T	915,000	1100	11.000	6.000	1365	8.3	24.80	19.05	9.40	15.50	21.84	12.64	....	.250
1190T	1,210,000	1050	12.000	7.000	1710	9.7	26.60	20.65	10.20	17.20	23.93	12.80	....	.250
1200T	1,650,000	900	13.000	7.000	2331	12.4	29.80	22.25	11.00	19.60	26.00	14.00	....	.250
1210T	2,200,000	820	14.000	7.000	3140	23.2	33.25	24.50	12.00	21.00	29.56	17.00	....	.500
1220T	2,970,000	730	15.000	8.000	3935	35.4	36.25	26.10	12.80	22.50	32.37	19.30	....	.500
1230T	3,850,000	680	16.000	8.000	4997	53.0	39.50	27.70	13.60	24.00	35.62	21.50	....	.500
1240T	4,950,000	630	17.000	10.000	6504	74.5	42.80	29.50	14.50	25.50	....	25.50	....	.500
1250T	6,600,000	580	18.500	10.000	8450	110.5	46.50	32.10	15.80	28.00	....	27.50	....	.500
1260T	8,250,000	540	20.000	10.000	10322	148.1	49.64	34.50	17.00	30.00	....	30.00	....	.500

★ Refer to Page 3 for General Information and Reference Notes.

How To Use This Manual

This manual provides detailed instructions on maintenance, lubrication, installation, and parts identification. Use the table of contents below to locate required information.

Table of Contents

CAREFULLY FOLLOW THE INSTRUCTIONS IN THIS MANUAL FOR OPTIMUM PERFORMANCE AND TROUBLE FREE SERVICE.

INTRODUCTION

This manual applies to Sizes 1020T thru 1140T and 20T thru 140T10 Falk Steelflex Tapered Grid Couplings. Unless otherwise stated, information for Sizes 1020T thru 1140T applies to Sizes 20T thru 140T respectively, e.g. 1020T = 20T, 1100T = 100T, etc. These couplings are designed to operate in either the horizontal or vertical position without modification. Beginning in 1994, these couplings are being supplied with one set of inch series fasteners and one set of metric fasteners. Use either set of fasteners, depending on your preference. Refer to Page 6 for part interchangeability.

The performance and life of the couplings depend largely upon how you install and service them.

CAUTION: *Consult applicable local and national safety codes for proper guarding of rotating members. Observe all safety rules when installing or servicing couplings.*

WARNING: *Lockout starting switch of prime mover and remove all external loads from drive before installing or servicing couplings.*

LUBE FITTINGS

Cover halves have $^{1}/_{8}$ NPT lube holes. Use a standard grease gun and lube fitting as instructed on Page 4.

LIMITED END FLOAT

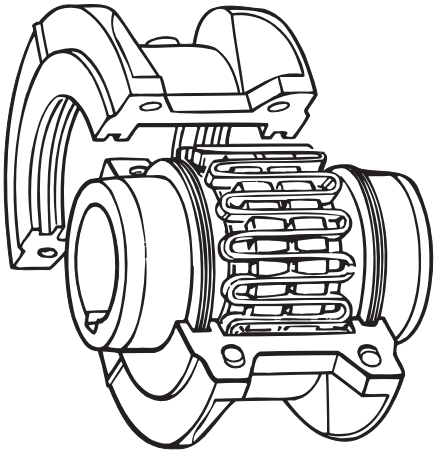
When electric motors, generators, engines, compressors and other machines are fitted with sleeve or straight roller bearings, limited axial end float kits are recommended for protecting the bearings. Falk Steelflex couplings are easily modified to limit end float; refer to Manual 428-820 for instructions.

LUBRICATION

Adequate lubrication is essential for satisfactory operation. Page 2 provides a list of typical lubricants and specifications for general purpose and long term greases. Because of its superior lubricating characteristics and low centrifuge properties, Falk Long Term Grease (LTG) is highly recommended. Sizes 1020T to 1090T10 are furnished with a pre-measured amount of grease for each coupling. The grease can be ordered for larger size couplings.

The use of general purpose grease requires re-lubrication of the coupling at least annually.

TYPE T10 STEELFLEX COUPLING



Long Term Grease (LTG)

The high centrifugal forces encountered in couplings separate the base oil and thickener of general purpose greases. Heavy thickener, which has no lubrication qualities, accumulates in the grid-groove area of Steelflex couplings resulting in premature hub or grid failure unless periodic lubrication cycles are maintained.

Falk Long Term Grease (LTG) was developed specifically for couplings. It resists separation of the oil and thickener. The consistency of Falk LTG changes with operating conditions. As manufactured it is an NLGI #1/2 grade. Working of the lubricant under actual service conditions causes it to become semifluid while the grease near the seals will set to a heavier grade, helping to prevent leakage.

LTG is highly resistant to separation, easily out performing all other lubricants tested. The resistance to separation allows the lubricant to be used for relatively long periods of time.

Steelflex couplings initially lubricated with LTG will not require re-lubrication until the connected equipment is stopped for servicing. If a coupling leaks grease, is exposed to extreme temperatures, excessive moisture, or experiences frequent reversals, more frequent lubrication may be required.

Although LTG grease is compatible with most other coupling greases, the mixing of greases may dilute the benefits of LTG.

USDA Approval

LTG has the United States Department of Agriculture Food Safety & Inspection Service approval for applications where there is no possibility of contact with edible products. (H-2 ratings).

CAUTION: *Do not use LTG in bearings.*

MORE>

Specifications — Falk LTG

The values shown are typical and slight variations are permissible.

AMBIENT TEMPERATURE RANGE — -20°F (-29°C) to 250°F (121°C). Min. Pump = 20° F (-7° C).

MINIMUM BASE OIL VISCOSITY — 3300SSU (715cST) @ 100°F (38°C).

THICKENER — Lithium & soap/polymer.

CENTRIFUGE SEPARATION CHARACTERISTICS — ASTM #D4425 (Centrifuge Test) — K36 = 2/24 max., very high resistance to centrifuging.

NLGI GRADE (ASTM D-217) — $^1/_2$

MINIMUM DROPPING POINT — with 60 stroke worked penetration value in the range of 320 to 365 — 350°F (177°C) min.

MINIMUM TIMKEN O.K. LOAD — 40 lbs.

ADDITIVES — Rust and oxidation inhibitors that do not corrode steel or swell or deteriorate synthetic seals.

Packaging

14 oz. (0,4 kg) CARTRIDGES — Individual or case lots of 10 or 60.

35 lb. (16 kg)PAIL, 120 lb. (54 kg) KEG & 400 lb. (181 kg) DRUMS.

General Purpose Grease

Annual Lubrication — The following specifications and lubricants for general purpose grease apply to Falk Steelflex couplings that are lubricated annually and operate within ambient temperatures of 0°F to 150°F (-18°C to 66°C). For temperatures beyond this range (see Table 1), consult the Factory.

If a coupling leaks grease, is exposed to extreme temperatures, excessive moisture or experiences frequent reversals, more frequent lubrication may be required.

Specifications — General Purpose Coupling Lubricants

The values shown are typical and slight variations are permissible.

DROPPING POINT — 300°F (149°C) or higher.

CONSISTENCY — NLGI No. 2 with 60 stroke worked penetration value in the range of 250 to 300.

SEPARATION AND RESISTANCE — Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT — Possess good lubricating properties equivalent to a high quality, well refined petroleum oil.

INACTIVE — Must not corrode steel or cause swelling or deterioration of synthetic seals.

CLEAN — Free from foreign inclusions.

General Purpose Greases Meeting Falk Specifications

Lubricants listed below are typical products only and should not be construed as exclusive recommendations.

TABLE 1 — General Purpose Greases

Ambient Temperature Range	0°F to 150°F (-18°C to 66°C)	-30°F to 100°F (-34°C to 38°C)
Manufacturer	**Lubricant †**	**Lubricant †**
Amoco Oil Co.	Amolith Grease #2	Amolith Grease #2
BP Oil Co.	Energrease LS-EP2	Energrease LS-EP1
Chevron U.S.A. Inc.	Dura-Lith EP2	Dura-Lith EP1
Citgo Petroleum Corp.	Premium Lithium Grease EP2	Premium Lithium Grease EP1
Conoco Inc.	EP Conolith Grease #2	EP Conolith Grease #2
Exxon Company, USA	Unirex N2	Unirex N2
E.F. Houghton & Co.	Cosmolube 2	Cosmolube 1
Imperial Oil Ltd.	Unirex N2L	Unirex N2L
Kendall Refining Co.	Lithium Grease L421	Lithium Grease L421
Keystone Div. (Pennwalt)	81 EP-2	81 EP-1
Lyondell Petrochemical (ARCO)	Litholine H EP 2 Grease	Litholine H EP 2 Grease
Mobil Oil Corp.	Mobilux EP111	Mobilith AW1
Petro-Canada Products	Multipurpose EP2	Multipurpose EP1
Phillips 66 Co.	Philube Blue EP	Philube Blue EP
Shell Oil Co.	Alvania Grease 2	Alvania Grease 2
Shell Canada Ltd.	Alvania Grease 2	Alvania Grease 2
Sun Oil Co.	Ultra Prestige 2EP	Ultra Prestige 2EP
Texaco Lubricants	Starplex HD2	Multifak EP2
Unocal 76 (East & West)	Unoba EP2	Unoba EP2
Valvoline Oil Co.	Multilube Lithium EP Grease	. . .

★ Grease application or re-lubrication should be done at temperatures above 20°F (-7°C). If grease must be applied below 20°F (-7°C), consult The Falk Corporation.

† Lubricants listed may not be suitable for use in the food processing industry; check with lube manufacturer for approved lubricants.

INSTALLATION OF TYPE T10 STEELFLEX TAPERED GRID COUPLINGS

Installation

Only standard mechanics tools, wrenches, a straight edge and feeler gauges are required to install Falk Steelflex couplings. Coupling Sizes 1020T thru 1090T are generally furnished for CLEARANCE FIT with setscrew over the keyway. Sizes 1100T and larger are furnished for an INTERFERENCE FIT without a setscrew.

CLEARANCE FIT HUBS — Clean all parts using a non-flammable solvent. Check hubs, shafts and keyways for burrs. Do not heat clearance fit hubs. Install keys, mount hubs with flange face flush with shaft ends or as otherwise specified and tighten setscrews.

INTERFERENCE FIT HUBS — Furnished without setscrews. Heat hubs to a maximum of 275°F (135°C) using an oven, torch, induction heater or an oil bath. To prevent seal damage, DO NOT heat hubs beyond a maximum temperatue of 400°F (205°C).

When an oxy-acetylene or blow torch is used, use an excess acetylene mixture. Mark hubs near the center of their length in several places on hub body with a temperature sensitive crayon, 275°F (135°C) melt temperature. Direct flame towards hub bore using constant motion to avoid overheating an area.

MORE>

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WARNING: If an oil bath is used, the oil must have a flash point of 350°F (177°C) or higher. Do not rest hubs on the bottom of the container. Do not use an open flame in a combustible atmosphere or near combustible materials.

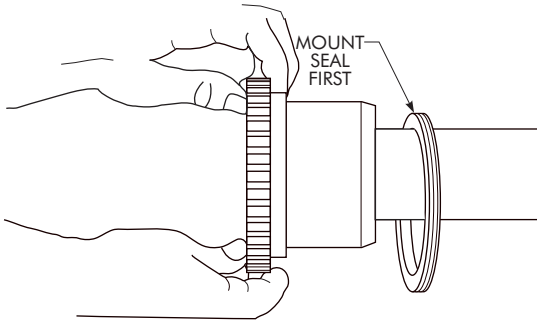
Heat hubs as instructed above. Mount hubs as quickly as possible with hub face flush with shaft end. Allow hubs to cool before proceeding. Insert setscrews (if required) and tighten.

Maximize Performance And Life

The performance and life of couplings depend largely upon how you install and maintain them. Before installing couplings, make certain that foundations of equipment to be connected meet manufacturers' requirements. Check for soft foot. The use of stainless steel shims is recommended. Measuring misalignment and positioning equipment within alignment tolerances is simplified with an alignment computer. These calculations can also be done graphically or mathematically.

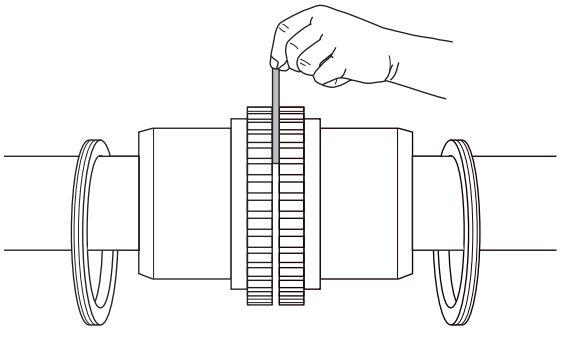
Alignment is shown using spacer bar and straight edge. This practice has proven to be adequate for many industrial applications. However, for superior final alignment, the use of dial indicators (see Manual 458-834 for instructions), lasers, alignment computers or graphical analysis is recommended.

1— Mount Seals And Hubs



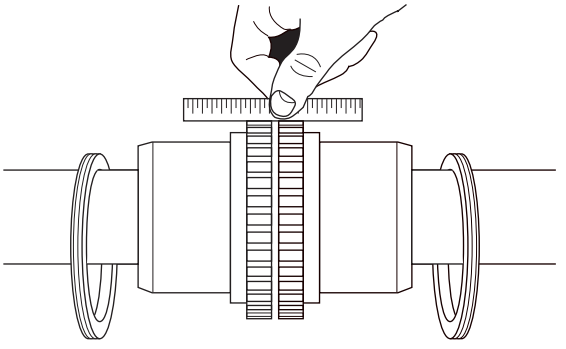
Lock out starting switch of prime mover. Clean all metal parts using a non-flammable solvent. Lightly coat seals with grease and place on shafts BEFORE mounting hubs. Heat interference fit hubs as previously instructed. Seal keyways to prevent leakage. Mount hubs on their respective shafts so the hub face is flush with the end of its shaft unless otherwise indicated. Tighten setscrews when furnished.

2 — Gap and Angular Alignment



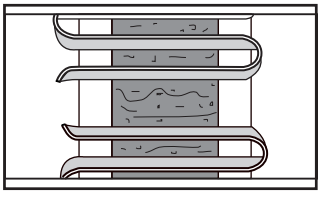
Use a spacer bar equal in thickness to the gap specified in Table 2, Page 5. Insert bar as shown below left, to same depth at 90° intervals and measure clearance between bar and hub face with feelers. The difference in minimum and maximum measurements must not exceed the ANGULAR installation limits specified in Table 2.

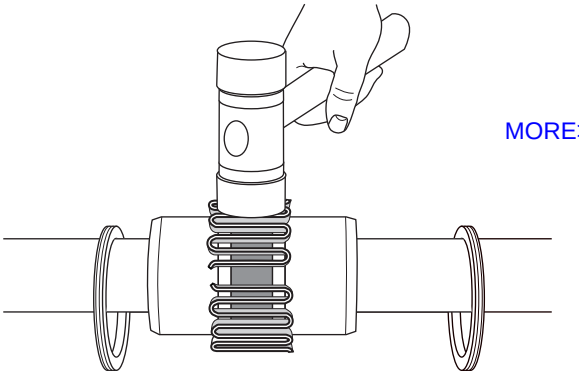
3 — Offset Alignment



Align so that a straight edge rests squarely (or within the limits specified in Table 2) on both hubs as shown above and also at 90° intervals. Check with feelers. The clearance must not exceed the PARALLEL OFFSET installation limits specified in Table 2. Tighten all foundation bolts and repeat Steps 2 and 3. Realign coupling if necessary.

4 — Insert Grid

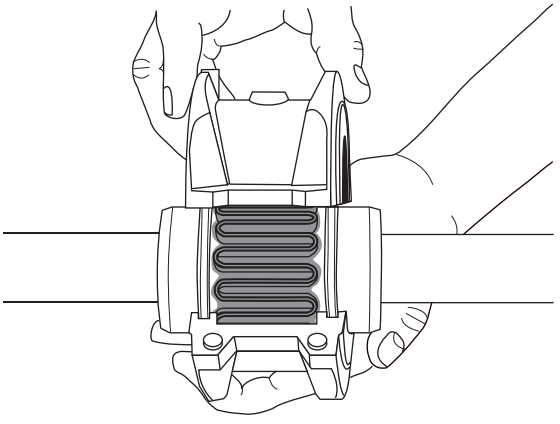


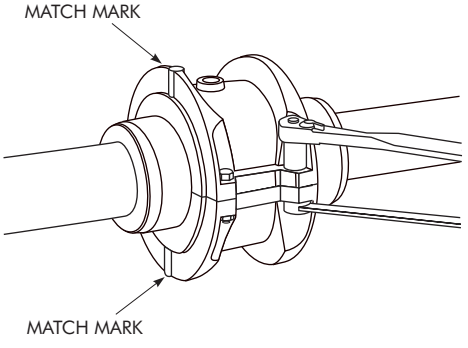


MORE>

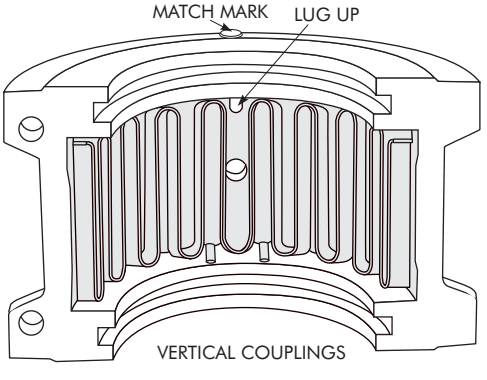
Pack gap and grooves with specified lubricant before inserting grid. When grids are furnished in two or more segments, install them so that all cut ends extend in the same direction (as detailed in the exploded view picture above); this will assure correct grid contact with non-rotating pin in cover halves. Spread the grid slightly to pass over the coupling teeth and seat with a soft mallet.

5 — Pack With Grease And Assemble Covers





Pack the spaces between and around the grid with as much lubricant as possible and wipe off excess flush with top of grid. Position seals on hubs to line up with grooves in cover. Position gaskets on flange of lower cover half and assemble covers so that the match marks are on the same side (see above). If shafts are not level (horizontal) or coupling is to be used vertically, assemble cover halves with the lug and match mark



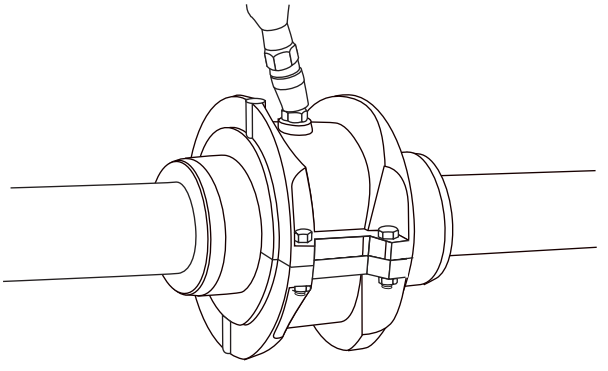
UP or on the high side. Push gaskets in until they stop against the seals and secure cover halves with fasteners, tighten to torque specified in Table 2. Make sure gaskets stay in position during tightening of fasteners. ***CAUTION:*** *Make certain lube plugs are installed before operating.*

ANNUAL MAINTENANCE

For extreme or unusual operating conditions, check coupling more frequently.

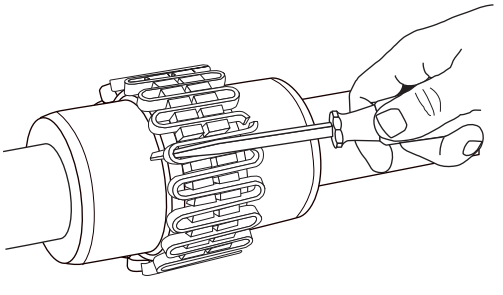
1. Check alignment per steps on Page 3. If the maximum operating misalignment limits are exceeded, realign the coupling to the recommended installation limits. See Table 2 for installation and operating alignment limits.
2. Check tightening torques of all fasteners.
3. Inspect seal ring and gasket to determine if replacement is required. If leaking grease, replace.
4. When connected equipment is serviced, disassemble the coupling and inspect for wear. Replace worn parts. Clean grease from coupling and repack with new grease. Install coupling using new gasket as instructed in this manual.

Periodic Lubrication



The required frequency of lubrication is directly related to the type of lubricant chosen, and the operating conditions. Steelflex couplings lubricated with common industrial lubricants, such as those shown in Table 1, should be relubed annually. The use of Falk Long Term Grease (LTG) will allow relube intervals to be extended to beyond five years. When relubing, remove both lube plugs and insert lube fitting. Fill with recommended lubricant until an excess appears at the opposite hole. ***CAUTION:*** Make certain all plugs have been inserted after lubricating.

Coupling Disassembly And Grid Removal



Whenever it is necessary to disconnect the coupling, remove the cover halves and grid. A round rod or screwdriver that will conveniently fit into the open loop ends of the grid is required. Begin at the open end of the grid section and insert the rod or screwdriver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the grid out radially in even, gradual stages, proceeding alternately from side to side.

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TYPE T COUPLING INSTALLATION & ALIGNMENT DATA

Maximum life and minimum maintenance for the coupling and connected machinery will result if couplings are accurately aligned. Coupling life expectancy between initial alignment and maximum operating limits is a function of load, speed and lubrication. Maximum operating values listed in Table 2 are based on cataloged allowable rpm.

Values listed are based upon the use of the gaps listed, standard coupling components, standard assemblies and cataloged allowable speeds.

Values may be combined for an installation or operating condition.

Example: 1060T max. operating misalignment is .016" parallel plus .018" angular.

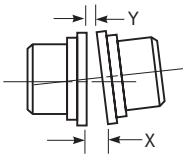
NOTE: For applications requiring greater misalignment, refer application details to Falk.

Angular misalignment is dimension X minus Y as illustrated below.

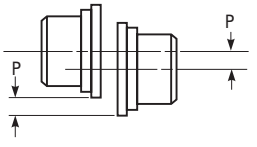
Parallel misalignment is distance P between the hub center lines as illustrated below.

End float (with zero angular and parallel misalignment) is the axial movement of the hubs(s) within the cover(s) measured from "O" gap.

ANGULAR MISALIGNMENT



PARALLEL OFFSET MISALIGNMENT



END FLOAT

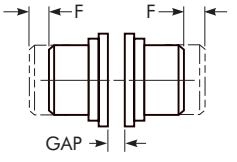


TABLE 2 — Misalignment & End Float

SIZE	Installation Limits						Operating Limits						Cover Fastener Tightening Torque Values		Allow Speed (rpm)	Lube Wt	
	Parallel Offset-P		Angular (x-y)		Hub Gap ± 10%		Parallel Offset-P		Angular (x-y)		End Float Physical Limit (Min) 2 x F						
	Max Inch	Max mm	Max Inch	Max mm	Inch	mm	Max Inch	Max mm	Max Inch	Max mm	Inch	mm	In Series Fasteners (lb-in)	Metric Fasteners (Nm)		lb	kg
1020T	.006	0,15	.003	0,08	.125	3	.012	0,30	.010	0,25	.210	5,33	100	11,3	4500	.06	0,03
1030T	.006	0,15	.003	0,08	.125	3	.012	0,30	.012	0,30	.198	5,03	100	11,3	4500	.09	0,04
1040T	.006	0,15	.003	0,08	.125	3	.012	0,30	.013	0,33	.211	5,36	100	11,3	4500	.12	0,05
1050T	.008	0,20	.004	0,10	.125	3	.016	0,41	.016	0,41	.212	5,38	200	23,6	4500	.15	0,07
1060T	.008	0,20	.005	0,13	.125	3	.016	0,41	.018	0,46	.258	6,55	200	23,6	4350	.19	0,09
1070T	.008	0,20	.005	0,13	.125	3	.016	0,41	.020	0,51	.259	6,58	200	23,6	4125	.25	0,11
1080T	.008	0,20	.006	0,15	.125	3	.016	0,41	.024	0,61	.288	7,32	200	23,6	3600	.38	0,17
1090T	.008	0,20	.007	0,18	.125	3	.016	0,41	.028	0,71	.286	7,26	200	23,6	3600	.56	0,25
1100T	.010	0,25	.008	0,20	.188	5	.020	0,51	.033	0,84	.429	10,90	312	35	2440	.94	0,43
1110T	.010	0,25	.009	0,23	.188	5	.020	0,51	.036	0,91	.429	10,90	312	35	2250	1.1	0,51
1120T	.011	0,28	.010	0,25	.250	6	.022	0,56	.040	1,02	.556	14,12	650	73	2025	1.6	0,74
1130T	.011	0,28	.012	0,30	.250	6	.022	0,56	.047	1,19	.551	14,00	650	73	1800	2.0	0,91
1140T	.011	0,28	.013	0,33	.250	6	.022	0,56	.053	1,35	.571	14,50	650	73	1650	2.5	1,14

TABLE 3 — Coupling Cover Fastener Identification

SIZE	Inch Series Fasteners				METRIC FASTENERS	
	Old Style		New Style			
1020-1070T10		SAE Grade 8 ★		SAE Grade 8		Property Class 10.9
1080-1090T10		SAE Grade 8		SAE Grade 8		Property Class 10.9
1100-1140T10		SAE Grade 5		SAE Grade 5		Property Class 8.8

★ Older style covers, Sizes 1020T10 thru 1070T10 must utilize socket head cap screws and locknuts held by the cover.

PARTS IDENTIFICATION

All coupling parts have identifying part numbers as shown below. Parts 3 and 4 (Hubs and Grids), are the same for both Type T10 and T20 couplings. All other coupling parts are unique to Type T10. When ordering parts, always SPECIFY SIZE and TYPE shown on the COVER.

PARTS INTERCHANGEABILITY

Parts are interchangeable between Sizes 20T and 1020T, 30T and 1030T, etc. except as noted.

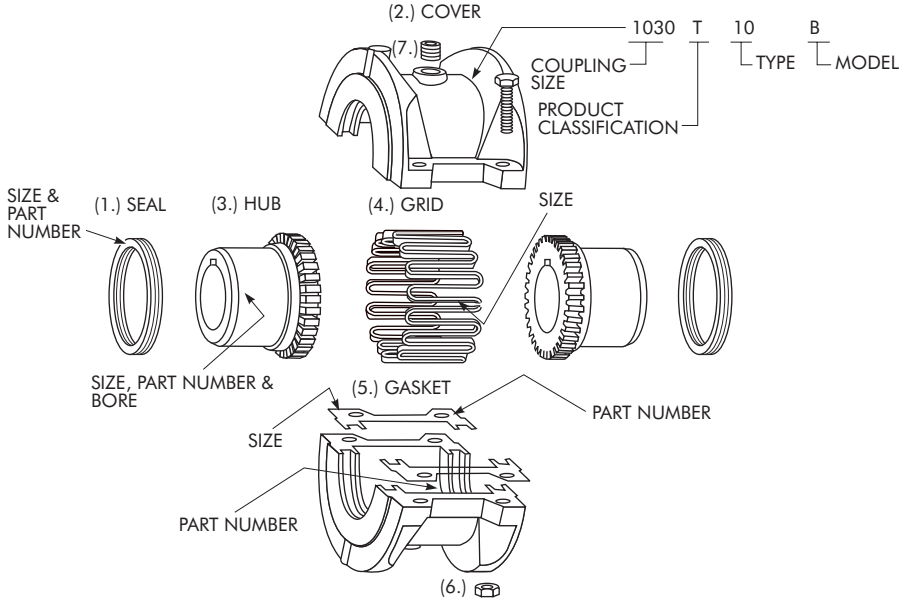
GRIDS — Size 1020T thru 1140T Steelflex couplings use blue grids. Older models, 20T thru 140T, use orange grids.

CAUTION: *Blue grids may be used in all applications, but DO NOT substitute orange grids for blue.*

COVERS — ***CAUTION:*** *DO NOT mix cover halves of different designs. Sizes 1020T thru 1070T10 covers have been manufactured in several different two-rib designs and 80T thru 140T covers have been manufactured with two and three ribs.*

HARDWARE — Older style covers, Sizes 1020T10 thru 1070T10, utilized socket head cap screws with captured locknuts. The new style covers use hex head cap screws (either inch or metric) and unrestrained locknuts. Specify either inch series SOCKET head or metric series HEX head cap screws when ordering replacement parts.

PART NUMBER LOCATION



PART DESCRIPTION

1. Seal (T10)
2. Cover (T10)
3. Hub (Specify bore and keyway)
4. Grid
5. Gasket (T10)
6. Fasteners (T10) — Coupling may be supplied with one set each of inch series fasteners and metric fasteners.
7. Lube Plug

ORDER INFORMATION

1. Identify part(s) required by name above.
2. Furnish the following information.

   EXAMPLE:
   Coupling Size: 1030
   Coupling Type: T10
   Model: B
   Bore: 1.375
   Keyway: .375 x .187
3. Price parts from Price List 422-110 and appropriate discount sheet.

The Falk Corporation, P.O. Box 492, Zip 53201-0492
3001 W. Canal St., Zip 53208-4200, Milwaukee, WI USA Telephone: 414-342-3131
Fax: 414-937-4359 e-mail: falkinfo@falkcorp.com web: www.falkcorp.com

Introduction

Adequate lubrication is essential for satisfactory operation. This manual provides a list of typical lubricants and specifications for general purpose and long term greases.

The use of general purpose grease requires re-lubrication of the coupling at least annually. By initially using Falk long term grease (LTG), re-lubrication will not be required again until the connected equipment is stopped for servicing.

Long Term Grease (LTG)

The high centrifugal forces encountered in couplings separate the base oil and thickener of general purpose greases. Heavy thickener which has no lubrication qualities, accumulates in the grid-groove area of Steelflex couplings resulting in premature hub or grid failure unless periodic lubrication cycles are maintained.

LONG TERM LTG GREASE

Falk LTG was developed specifically for couplings. It resists separation of the oil and thickener. The consistency of Falk LTG changes with operating conditions. As manufactured it is an NLG1 #1/2 grade. Working of the lubricant under actual service conditions causes it to become semifluid while the grease near the seals will set to a heavier grade, helping to prevent leakage

LTG is highly resistant to separation, easily out performing all other lubricants tested. The resistance to separation allows the lubricant to be used for relatively long periods of time.

Steelflex couplings initially lubricated with Falk Long Term grease (LTG) will not require re-lubrication until the connected equipment is stopped for servicing. If a coupling leaks grease, is exposed to extreme temperatures, excessive moisture or experiences frequent reversals, more frequent lubrication may be required.

USDA Approval

LTG has the United States Department of Agriculture Food Safety & Inspection Service approval for applications where there is no possibility of contact with edible products. (H-2 rating).

CAUTION: Do not use LTG in bearings.

Specifications

The values shown are typical and slight variations are permissible.

AMBIENT TEMPERATURE RANGE — –20°F (–29°C) to 250°F (121°C). Min. Pump = 20°F (–7°C)

MINIMUM BASE OIL VISCOSITY — 3300SSU (715cST) @ 100°F (38°C)

THICKENER — Lithium & soap/polymer.

CENTRIFUGE SEPARATION CHARACTERISTICS — ASTM #D4425-84 Centrifuge Test) — K36 = 2/24 maximum, very high resistance to centrifuging.

NLGI GRADE (ASTM D-217) — 1/2

CONSISTENCY (ASTM D-217) — 60 stroke worked penetration value in the range of 315 to 360 measured at 77°F (25°C)

MINIMUM DROPPING POINT — 350°F (177°C) min.

MINIMUM TIMKEN EP O.K. LOAD — 40 lb (18 kg).

ADDITIVES — Rust and oxidation inhibitors that do not corrode steel or swell or deteriorate synthetic seals.

INSPECTION — When connected equipment is serviced, disassemble the coupling and inspect for wear. Replace worn parts. Clean the grease from the coupling and repack with fresh LTG. Install coupling using new gasket as instructed in the appropriate installation manual.

Packaging

14 oz CARTRIDGES — For use in standard industrial lubrication guns.

35 lb PAILS — Ideal for larger size couplings or many smaller sizes.

120 lb KEG — For plants with many small couplings or large size couplings. Best for hand packing.

400 lb DRUMS — For plants with a pressurized lubrication system.

CASE LOTS — 10 pack – 14 oz cartridges, 60 – 14 oz cartridges.

The Falk Corporation, P.O. Box 492, Zip 53201-0492
3001 W. Canal St., Zip 53208-4200, Milwaukee, WI USA Telephone: 414-342-3131
Fax: 414-937-4359 e-mail: falkinfo@falkcorp.com web: www.falkcorp.com

428-010
February 1996 (.pdf revision)
Supersedes 6-88

General Purpose Grease

ANNUAL LUBRICATION — The following specifications and lubricants for general purpose grease apply to Falk Steelflex couplings that are lubricated annually and operate within ambient temperatures of 0° to 150°F (–18° to 66°C) For temperatures beyond this range, consult the Factory.

If coupling leaks grease, is exposed to extreme temperatures, excessive moisture or experiences frequent reversals; more frequent lubrication may be required.

Specifications — General Purpose Coupling Lubricants

The values shown are typical and slight variations are permissible.

DROPPING POINT — 300°F (149°C) or higher.

CONSISTENCY — NLGI No. 2 with 60 stroke worked penetration value in the range of 265 to 295.

SEPARATION AND RESISTANCE — Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT — Possess good lubricating properties, equivalent to a high quality, well refined petroleum oil.

INACTIVE — Must not corrode steel or cause swelling or deterioration of synthetic seals.

CLEAN — Free from foreign inclusions.

General Purpose Greases Meeting Falk Specifications

Lubricants listed in Table 1 are typical products only and should not be construed as exclusive recommendations.

TABLE 1 — General Purpose Greases

Ambient Temperature Range	0°F to 150°F (–18°C to +66°C)	–30°F to 100° F –34°C to +38°C)
Manufacturer	**Lubricant**	**Lubricant**
Amoco Oil Co.	Amolith Grease #2	Amolith Grease #2
BP Oil Co.	Energrease LS-EP2	Energrease LS-EP1
Chevron U.S.A. Inc.	Dura-Lith EP2	Dura-Lith EP1
Citgo Petroleum Corp.	Premium Lithium Grease EP2	Premium Lithium Grease EP1
Conoco Inc.	EP Conolith Grease #2	EP Conolith Grease #2
Exxon Company, USA	Unirex N2	Unirex N2
E.F. Houghton & Co.	Cosmolube 2	Cosmolube 1
Imperial Oil Ltd.	Unirex N2L	Unirex N2L
Kendall Refining Co.	Lithium Grease L421	Lithium Grease L421
Keystone Div. (Pennwalt) Corp.	81 EP-2	81 EP-1
Lyondell Petrochemical (ARCO)	Litholine H EP 2 Grease	Litholine H EP 2 Grease
Mobil Oil Corp.	Mobilux EP111	Mobilith AW1
Petro-Canada Products	Multipurpose EP2	Multipurpose EP1
Phillips 66 Co.	Philube Blue EP	Philube Blue EP
Shell Oil Co.	Alvania Grease 2	Alvania Grease 2
Shell Canada Ltd.	Alvania Grease 2	Alvania Grease 2
Sun Oil Co.	Ultra Prestige 2EP	Ultra Prestige 2EP
Texaco Lubricants	Starplex HD2	Multifak EP2
Unocal 76 (East & West)	Unoba EP2	Unoba EP2
Valvoline Oil Co.	Multilube Lithium EP Grease	. . .

★ Grease application or re-lubrication should be done at temperatures above 20°F (7°C). If grease must be applied below 20°F (7°C), consult The Falk Corporation. Lubricants listed may not be suitable for use in the food processing industry; check with lube manufacturer for approved lubricants.

The Falk Corporation, P.O. Box 492, Zip 53201-0492
3001 W. Canal St., Zip 53208-4200, Milwaukee, WI USA Telephone: 414-342-3131
Fax: 414-937-4359 e-mail: falkinfo@falkcorp.com web: www.falkcorp.com

Pentair Pump Group

3601 Fairbanks Avenue
Kansas City, KS 66110
913-371-5000 FAX 913-748-4025

CERTIFIED MOTOR PERFORMANCE DATA

MOTOR MANUFACTURER: U.S. ELECTRICAL MOTORS **DATE:** 20-Mar-12

FM PURCHASE ORDER #: 2706142 **FM TAG#:** 095077A01

PERFORMANCE DATA BASED ON STANDARD RULES OF: X IEEE X ASA X NEMA

HP	SYNCHRONOUS SPEED (RPM)	FULL LOAD * SPEED (RPM)	FRAME NUMBER	TYPE	ENCLOSURE
15	1800	1775	254VP	TVI	TEFC

*Full Load Speed Tolerance Per NEMA MG1-12.46 is+/- 20% of slip (Slip=Synchronous RPM-Full Load RPM)

PHASE	HERTZ	VOLTS	AMPERES		INSULATION CLASS	MAX. TEMP. RISE	SERVICE FACTOR	NEMA KVA/HP CODE	NEMA DESIGN
			FULL LOAD	LOCKED ROTOR		X RESIS. / THERM.			
3	60	230 460	38.9 19.5	221.0 110	F	105 DEG C AT 1.0 SF	1.15	G	B

MINIMUM GUAR EFFICIENCY			POWER FACTOR			TORQUE AT FULL VOLTAGE		
						FULL LOAD TORQUE AT FULL LOAD SPEED (LB.FT)	LOCKED STARTING	PULLOUT BREAKDOWN
FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD		PERCENT OF FULL LOAD	
89.5	90.9	90.0	82.9	79.6	71.3	44.4	228	243

VSS [X] VHS [ ] NRR [ ] SRC [ ] HORIZ [ ]

BEARINGS:

Drive End Lubrication:
[ ] Oil [X] Grease

Opposite End Lubrication:
[ ] Oil [X] Grease

PAINT: (Attach Technical Data Sheets)
[X] Factory Standard
[ ] Other _____

MOTOR NO.: 11712967

MOTOR WEIGHT: 265 LBS.

ROTATION: [X] BI-DIRECTIONAL [ ] CW [ ] CCW

Certified by: _____ Date: 20-Mar-12 Revision # 1

FM013/0194

Pentair Pump Group

3601 Fairbanks Avenue
Kansas City, KS 66110
913-371-5000 FAX 913-748-4025

Accessory Data

Motor Manufacturer: U.S. ELECTRICAL MOTORS Date: 20-Mar-12

FM Purchase Order #: 2706142 FM Tag #: 095077A01

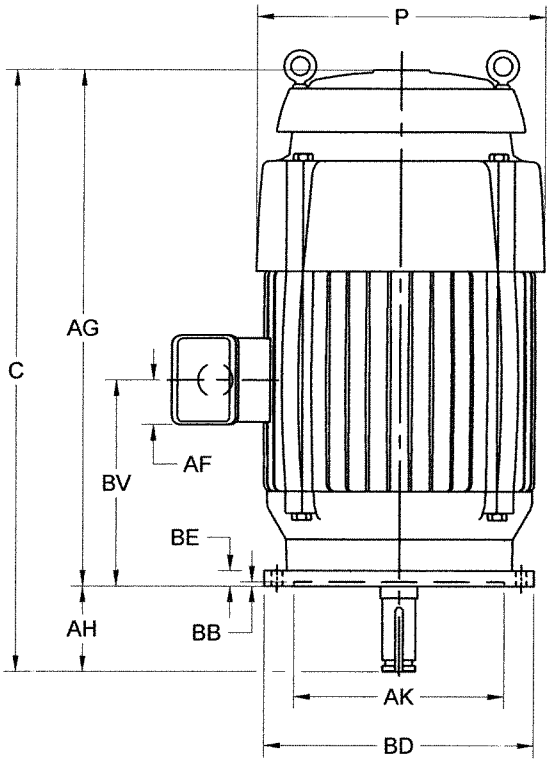
	Required	Not Required	Description
Space Heaters:	☐	☒	Watts: _____ Voltage: _____
Thermostats:	☒	☐	Type: ☐ N.O. ☒ N.C.
Thermistors:	☐	☒	Make & Model: _____ Trip Range: _____ Quantity Per Motor: _____ ☐ relay not Supplied ☐ relay supplied: Type: ☐ factory set ☐ field adjustable ☐ wiring diagram/cut sheet attached. Ref.: _____
Winding RTD's:	☐	☒	Make & Model: _____ Construction/OHM Rating: _____ Quantity Per Motor: _____ ☐ relay not Supplied ☐ relay supplied: Type: ☐ factory set ☐ field adjustable ☐ wiring diagram/cut sheet attached. Ref.: _____
Bearing RTD's:	☐	☒	Make & Model: _____ Construction/OHM Rating: _____ Quantity ☐ relay not Supplied ☐ relay supplied: Type: ☐ factory set ☐ field adjustable ☐ wiring diagram/cut sheet attached. Ref.: _____
Vibration Sensor:	☐	☒	Make & Model: _____ Quantity ☐ relay not Supplied ☐ relay supplied: Type: ☐ factory set ☐ field adjustable ☐ wiring diagram/cut sheet attached. Ref.: _____
Tests:	☒	☐	☒ Short commercial, unwitnessed ☐ Short commercial, witnessed ☐ Complete Initial Test, unwitnessed ☐ Complete Initial Test, witnessed ☐ Sound Test, unwitnessed ☐ Sound Test, witnessed ☐ Vibration Test, unwitnessed ☐ IEEE 841 + No Load Test

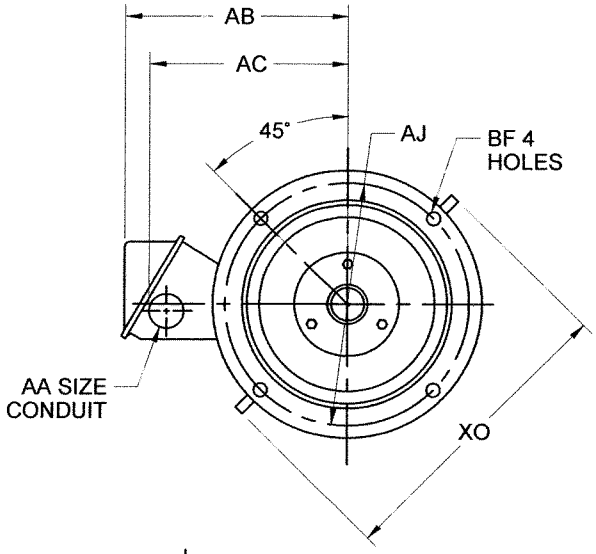
Other Features: TEFC, VERTICAL SOLID SHAFT, NORMAL THRUST, PREMIUM EFFICIENT, INVERTER DUTY 1.15 SERVICE FACTOR (1.0 ON VFD POWER), CLASS F INSULATION, 40 DEGREE C AMBIENT, NEMA DESIGN B 5500 FT ALTITUDE, DUAL ROTATION, Q3 N.C. THERMOSTATS, OVERSIZED MAIN CONDUIT BOX, GROUND LUG GREASE LUBED BEARINGS, INSULIFE 2000 TRTMT STANDARD PAINT SYSTEM, BD = 10, AH = 2 3/4, U = 1 1/8

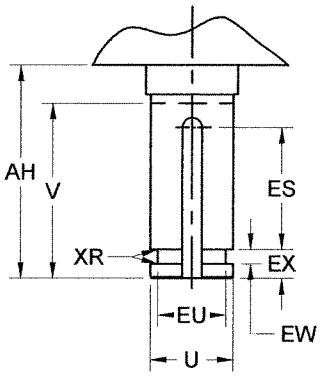
Exceptions & Clarifications: **REVISION #1, 3/20/2012:** PROVIDING KLIXON THERMOSTATS #9700K46-33. US MOTORS UTILIZING THEIR STANDARD PAINT SYSTEM, VALSPAR #5410-E-10009 ON THE PRIMER AND VALSPAR P/N AAA1024 DURASPAR 430 ON THE FINISH COAT. MSDS SHEETS ARE ATTACHED.

Certified by: _____ Date: 20-Mar-12 Revision #: 1

EFFECTIVE: 16-DEC-11	VERTICAL MOTORS TEFC - OVERSIZED (280) CONDUIT BOX FRAME: 254, 256VP, VPH TYPE: TV, TVE, TVI, TVS	PRINT: 1117-1-76
SUPERSEDES: 02-JUN-03		SHEET: 1 OF 1







ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

	UNITS	C	P [2]	U -.0005	V MIN	AA	AB	AC	AF	AG	AH ±.063	AJ
■	IN	26.88	13.31	1.1250	2.75	1.50	11.07	8.31	2.59	24.13	2.750	9.125
	MM	683	338	28.575	70		281	211	66	613	69.85	231.78

	UNITS	AK +.003	BB MIN	BE	BF	BV	ES MIN	EU -.005	EW +.002	EX -.005	XR	SQ KEY
■	IN	8.250	.19	1.00	.44	10.44	1.25	.875	.375	.750	.03	.250
	MM	209.55	5	25	11	265	32	22.23	9.53	19.05	1	6.35

	FRAME	UNITS	BD MAX
■	250VP	IN	10.00
		MM	254
	250VPH	IN	12.00
		MM	305

TOLERANCES	
FACE RUNOUT	.004 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.004 T.I.R.
PERMISSIBLE SHAFT RUNOUT	.002 T.I.R.

1. ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2. LARGEST MOTOR WIDTH.
3. CONDUIT OPENING MAY BE LOCATED IN STEPS OF 180°. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
4. TOLERANCES SHOWN ARE IN INCHES ONLY.

ISSUED BY	S. TORRES
APPROVED BY	E. LUNA

Sensata Technologies

9700

Thermal Protector for Motor/Fluorescent ballasts and Temperature Sensing Controls

KEY BENEFITS

Miniature size-compact design assures ease of installation

Precision Calibration-temperature calibrated and inspected in controlled ambients for dependable consistent performace

Snapaction-positive make and break assured with proven Klixon® strip disc...contact pressure at open temperature eliminates nuisance trips due to vibration

Sealed steel case-withstands impregnation and baking...maybe varnish dipped...prevents changes in calibration during installation

KLIXON®

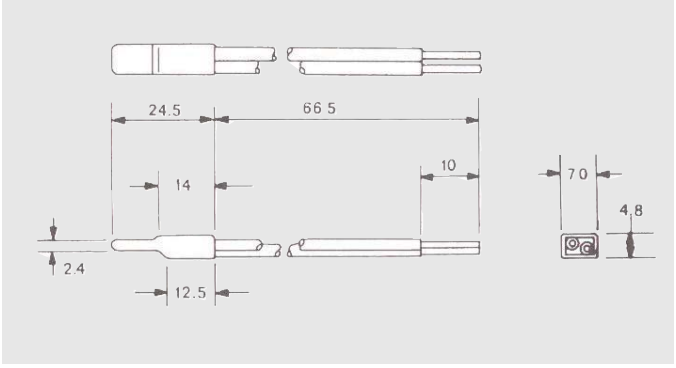
The Klixon® 9700 protector is a field proven miniature protector developed to protect shaded pole and permanent split capacitor motors, fluorescent ballasts, solenoids, transformers and other electrical equipment against overheating.

In addition to being small and lightweight, the unit is both temperature and current sensitive. Since the 9700 is sealed to withstand varnish dipping, it can be mounted directly in windings where it can best sense the true temperature of the electrical equipment. As a result, over-temperature protection is assured.

Since the case is not electrically insulated, the protector is furnished with a durable Mylar insulating sleeve. Shrinkable and non-shrinkable sleeves are available.

Technical Characteristics

Purpose of control:	thermal motor protector (TMP) thermal ballast protector (TBP) thermal cut-out (TCO)
Contact capacity:	250VAC 13A for TCO 250VAC 2A for TBP
Temperature range:	60°C to 150°C for TCO and TMP 60°C to 135°C for TBP
Tolerance on Open temp:	+/- 5K or +/- 8K
Automatic action:	Type 3C for TMP Type 2C for TBP and TCO
Operating time:	Continuous
Pollution situation:	Normal
Extent of sensing element:	Whole control
PTI of the insulation:	175
Enclosure protection degree:	IP00



Sensata Technologies

9700 X X YY - ZZZZ

Z : Wire Lead and sleeve
Serial number is assigned for each lead and sleeve configuration, i.e. wire type, length, AWG#, stripped length, sleeve type, and length.

Y : Operating temperature and actuation disc material
Serial number is assigned for each desired temperature and resistance rating.

Nominal operating temperature	Resistance of actuation disc (ohms/cmf)				
	30	250	850	100	475
	Temperature code				
60	56	57	58	59	60
80	91	92	93	94	95
90	21	22	23	24	25
100	26	27	28	29	30
110	36	37	38	39	40
120	1	2	3	4	5
130	11	12	13	14	15
140	66	67	68	69	70
150	46	47	48	49	50

This is a typical temperature code. There is a temperature code at each 5℃ in a step from 60 to 150℃.

X : Open Temperature tolerance
: +/- 5K
2: +/- 8K

X : Contact material combination

Code	Stationaly contact	Movable contact
K	Ag-Ni + Silver Cadmium oxide	Steel + copper + Silver Cadmium oxide
H	Brass + Fine silver	Steel + copper + Silver Cadmium oxide

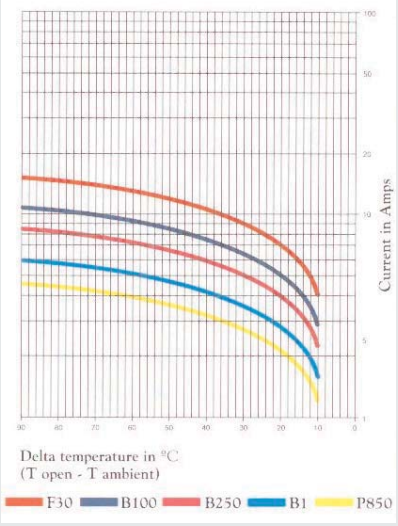
9700 : Device Identification

Example :
9700K01-215
Bimetal of 30ohms/cmf,
120°C operating temperature,
+/-5K tolerance with
AWG#18(UL3343 125℃-600V)
66.7mm length leads,
thick 0.15mm, dia. 6.9mm,
length 34mm, Mylar sleeve.

***Note*: We only provide H / K type devices. K type when new part number is defined and setup.**

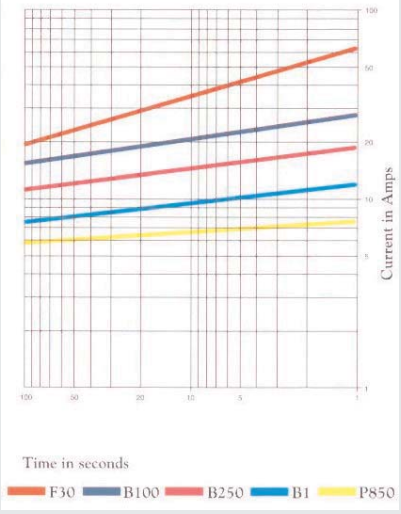
Ultimate trip current vs ambient temperature

Approx., to be used only for selecting samples for verification tests



Average first cycle tripping time vs current 25°C. ambient

Approx., to be used only for selecting samples for verification tests



Certifications

Agency	File number	Standard	Note
UL	E 15962	UL2111	Motor protector
ENEC	2014531.10	EN60730-2-9	Thermal cut-out
ENEC	2014531.10	EN60730-2-2	Thermal motor protector
ENEC	2014531.10	EN60730-2-3	Thermal ballast protector
CQC	CQC0200	2001344	

Sensata Technologies

TECHNICAL / SALES SUPPORT

Holland
Phone +31 546 879560 Fax +31 546 879204

Internet: *www.sensata.com*

Email: *info-cpe@list.sensata.com*

Printed in Holland, June 2010

11554 SH #2

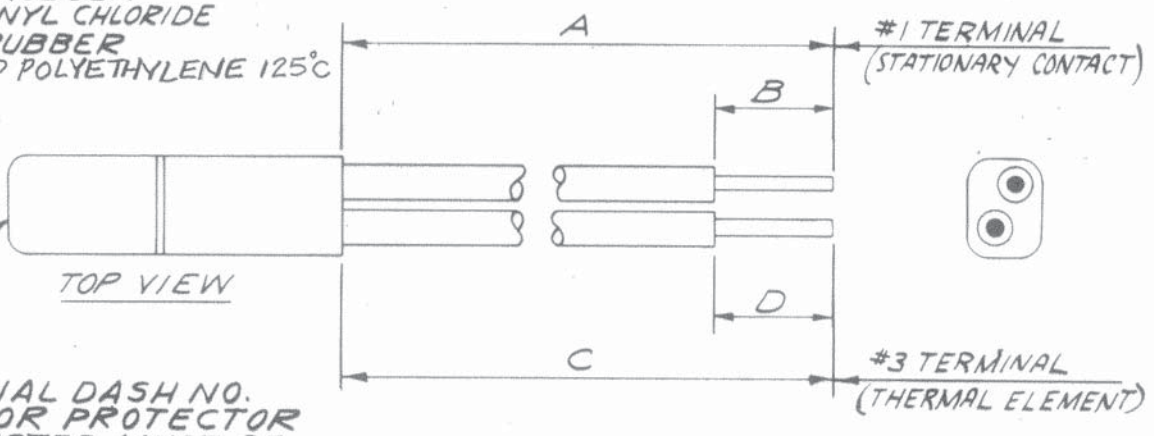
TITLE: LEAD INSPECTION FOR 9700 MOTOR PROTECTORS

AR 11554 SH #2

INSULATION CODE (SEE TABLE)
N - NEOPRENE RUBBER
P - 105°C POLYVINYL CHLORIDE
S - SILICONE RUBBER
X - CROSS-LINKED POLYETHYLENE 125°C

(AL)

FOR BASIC DIMENSIONS SEE SK 9700 REF IN TABLE



NOTE: THE FINAL DASH NO. OF THE MOTOR PROTECTOR BEING INSPECTED MUST BE THE SAME AS 11554 DASH NO. BEING USED. I.E. 9700H15-03 MUST BE INSPECTED TO 11554-03

SPEC. NO. 11554	A (LOWER)	B	SOLDER	C (UPPER)	D	SOLDER	INS. CODE	SK9700 SH.#	NOTE
-*-21	$4\frac{7}{16} \pm \frac{3}{16}$	$\frac{3}{16} \pm \frac{1}{16}$	NO	$4\frac{7}{16} \pm \frac{3}{16}$	$\frac{3}{16} \pm \frac{1}{16}$	NO	N	1	
~~-*-22~~	~~$4\frac{1}{2} \pm \frac{3}{16}$~~	~~$\frac{1}{4} \pm \frac{1}{16}$~~	~~NO~~	~~$1\frac{1}{4} \pm \frac{3}{16}$~~	~~$\frac{1}{4} \pm \frac{1}{16}$~~	~~NO~~	~~N~~	~~1~~	OBSOLETED CR134406
-*-23	$1\frac{1}{2}'' \pm \frac{1}{8}$	$\frac{1}{2} \pm \frac{1}{16}$	BONDED STRANDS	$1\frac{1}{2} \pm \frac{1}{8}$	$\frac{1}{2} \pm \frac{1}{16}$	BONDED STRANDS	N	1	
-*-24	$1\frac{9}{16} \pm \frac{3}{16}$	$\frac{5}{8} \pm \frac{1}{16}$	NO	$1\frac{9}{16} \pm \frac{3}{16}$	$\frac{5}{8} \pm \frac{1}{16}$	NO	N	1	
-*-25	$7 \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	NO	$1\frac{3}{8} \pm \frac{1}{8}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	N	1	
-*-26	$2\frac{5}{8} \pm \frac{3}{16}$	$1\frac{3}{8} \pm \frac{1}{16}$	NO	$1\frac{1}{2} \pm \frac{1}{8}$	$\frac{1}{2} \pm \frac{1}{16}$	NO	N	1	
-*-27	$9\frac{1}{4} \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	NO	$1\frac{3}{8} \pm \frac{1}{8}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	N	1	
-*-28	$4\frac{1}{8} \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	NO	$1\frac{3}{8} \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	N	1	
-*-29	$3\frac{1}{8} \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	BONDED STRANDS	$3\frac{1}{8} \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	BONDED STRANDS	T	1	LEAD A - BLACK LEAD C - RED
-*-30	$4\frac{15}{16} \pm \frac{3}{16}$	$\frac{3}{16} \pm \frac{1}{16}$	NO	$4\frac{15}{16} \pm \frac{3}{16}$	$\frac{3}{16} \pm \frac{1}{16}$	NO	N	1	
-*-31	$2\frac{5}{8} \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	$2\frac{5}{8} \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	S	1	A&C = WHITE
-*-32	$3\frac{1}{2} \pm \frac{3}{16}$	$\frac{11}{16} \pm \frac{1}{16}$	NO	$3\frac{1}{2} \pm \frac{3}{16}$	$\frac{3}{16} \pm \frac{1}{32}$	NO	N	1	
-*-33	$3\frac{1}{2} \pm \frac{3}{16}$	$\frac{11}{16} \pm \frac{1}{16}$	NO	$3\frac{1}{2} \pm \frac{3}{16}$	$\frac{11}{16} \pm \frac{1}{16}$	NO	X	1	
-*-34	$6\frac{1}{4} \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	NO	$1\frac{3}{8} \pm \frac{1}{8}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	N	1	
-*-35	$1\frac{1}{2} \pm \frac{1}{8}$	$\frac{1}{2} \pm \frac{1}{16}$	NO	$1\frac{1}{2} \pm \frac{1}{8}$	$\frac{1}{2} \pm \frac{1}{16}$	NO	N	1	
-*-36	$8\frac{3}{4} \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	$1\frac{3}{8} \pm \frac{1}{8}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	N	1	
-*-37	$5 \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	BONDED STRANDS	$5 \pm \frac{3}{16}$	$\frac{1}{4} \pm \frac{1}{16}$	BONDED STRANDS	N	1	A = BROWN C = BROWN
-*-38	$3\frac{1}{2} \pm \frac{3}{16}$	$\frac{3}{4} \pm \frac{1}{16}$	NO	$9\frac{1}{2} \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	P	2	USE CHESTER WIRE & CABLE ONLY
-*-39	$1\frac{3}{4} \pm \frac{1}{8}$	$\frac{3}{4} \pm \frac{1}{16}$	NO	$1\frac{3}{4} \pm \frac{1}{8}$	$\frac{3}{4} \pm \frac{1}{16}$	NO	N	1	
-*-40	$9 \pm \frac{3}{16}$	$\frac{3}{8} \pm \frac{1}{16}$	NO	$1\frac{3}{4} \pm \frac{1}{8}$	$\frac{3}{4} \pm \frac{1}{16}$	NO	N	1	

AR	OBSOLETED -22 EJ CR134406 10-27-89 DEC	AM	ADDED "600VOLTS" TO -31 CR64542 LCB 4-29-78			AG	ON -28 "B" WAS 3/8 ± 1/16 C.R. 30483 5-10-67
AP	-29 INS. CODE WAS "N" CR126229 J.B. 5-18-83 JGN	AL	INS. CODE FOR -33 WAS V125 X-CROSS-LINKED POLYETHYLENE 125°C WAS V125-VULKENE 125°C CR60197 RLB 5-21-74	AK	COLOR FOR -37 WAS WHITE CR60106 RLB 5-2-74	AF	ON -33 INS. CODE WAS "S" CR13609 LCB 11-24-64
AN	DELETED "600VOLTS" FROM -31 CR65593 BC 5-2-79			AJ	DELETED NOTE FROM -23 CR39055 LS 7-18-73	AE	ADDED NOTE TO -33 C.R. 11297 LCB 1-14-64
				AH	ADDED COLOR TO NOTE ON -31 & -37 CR38978 BC 6-21-73	AD	REDRAWN FOR 9700. ON -23 A&C WERE 2 3/16 ± 3/16. SOLDER WAS "NO" CR10959 A.C.L. 12-4-63

~~FS-1~~ ~~VS-1~~ CB-4 TS* LS*

SS-1 MA-S JS-1 ~~HS-1~~ ~~M34-1~~ ~~M33-1~~ M26-1 ~~M23-1~~ M21-1 ~~M20-1~~

REVISIONS.

BY A.C. LANE 12-4-63
CH. LCB 12-4-63
APP. WN MOKSU

METALS & CONTROLS INC.
A CORPORATE DIVISION OF
TEXAS INSTRUMENTS INCORPORATED
CONTROL PRODUCTS GROUP ATTLEBORO, MASS.

DWG. SIZE A

DWG. NO. 11554 SH. #2

K&E PHOENIX® TRACING CLOTH 71551

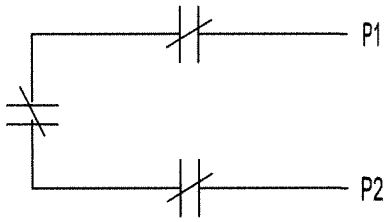
SUPERSEDES 11554 KLIXON® SH. #2 DATED 4-27-61 REVISION A.C

THERMOSTATS

1. MOTOR IS EQUIPPED WITH QTY-3 (1 PER PHASE) NORMALLY CLOSED THERMOSTATS. THERMOSTATS ARE SET TO OPEN AT HIGH TEMPERATURE.

2. CONTACT RATINGS FOR THERMOSTATS: 120-600 VAC, 720 VA

N. C. THERMOSTATS



NOTE: THERMOSTATS LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX.

ACCESSORY LISTING
QTY-3 N.C. THERMOSTATS

REVISION DESCRIPTION FOR: MISC STL0211 - UPDATED FORMAT .	SCALE: NONE	UNITS: IN	TITLE: CUSTOMER CONNECTION DIAGRAM		NIDEC MOTOR CORPORATION
MATERIAL: ---	TOLERANCES ON DIMENSIONS (UNLESS OTHERWISE SPECIFIED) INCHES / mm		ISSUED BY: R. KING	APPROVED BY: C. CADE	REVISION DATE: 24-FEB-11
MUST BE COMPLIANT TO RoHS DIRECTIVE EU 2002/95/IEC AND REGULATION EC 1907/2006 (REACH) AS AMENDED	ANGLES X°= ±1°		CODE	DWG NO. 0834066	REV G / SHEET NUMBER 1 OF 1 / DWG SIZE A

IX. LUBRICATION

Motor must be at rest and electrical controls should be locked open to prevent energizing while being serviced. If motor is being taken out of storage refer to **Section III "STORAGE", item 4** for instructions.

1. Oil Lubricated Bearings.

Motors are tested with oil at our manufacturing facility then drained prior to shipment. A small amount of residual oil and rust inhibitor will remain in the oil sump. This residual oil and rust inhibitor is compatible with Turbine Type Mineral Oils and Synthetic, PAO (Poly Alpha Olefin) based oils listed in this manual. It is not necessary to drain this residual oil when adding new oil for operation.

Change oil once per year with normal service conditions. Frequent starting and stopping, damp or dusty environment, extreme temperature, or any other severe service conditions will warrant more frequent oil changes. If there is any question, consult Emerson Motor Co. Product Service Department for recommended oil change intervals regarding your particular situation.

Determine required oil ISO Viscosity Grade (VG) and base oil type from Table 3, then see Table 4 for approved oils. Add oil into oil fill hole at each bearing housing until the oil level reaches between minimum and maximum marks located on the sight gauge window. It is important to wipe excess oil from the threads of the drain hole and to coat the plug threads with Gasoila®† P/N SS08, manufactured by Federal Process Corporation or equivalent thread sealant before replacing the drain plug. Plug should be tightened to a minimum of 20 lb.-ft. using a torque wrench. See the motor nameplate or Table 5 for the approximate quantity of oil required.

2. Grease Lubricated Bearings.

A. Relubrication of Units in Service

Grease lubricated bearings are pre-lubricated at the factory and normally do not require initial lubrication. Relubricating interval depends upon speed, type of bearing and service. Refer to Table 1 or suggested regreasing intervals and quantities. Note that operating environment and application may dictate more frequent lubrication. To relubricate bearings, remove the drain plug. Inspect grease drain and remove any blockage (caked grease or foreign particles) with a mechanical probe, taking care not to damage bearing.

⚠ WARNING

Under NO circumstances should a mechanical probe be used while the motor is in operation.

Add new grease at the grease inlet. New grease must be compatible with the grease already in the motor (refer to table 2 for compatible greases).

⚠ CAUTION

Greases of different bases (lithium, polyurea, clay, etc.) may not be compatible when mixed. Mixing such greases can result in reduced lubricant life and premature bearing failure. Prevent such intermixing by disassembling motor, removing all old grease and repacking with new grease per item B of this section. Refer to Table 2 for recommended greases.

Run the motor for 15 to 30 minutes with the drain plug removed to allow purging of any excess grease. Shut off unit and replace the drain plug. Return motor to service.

⚠ CAUTION

Overgreasing can cause excessive bearing temperatures, premature lubricant breakdown and bearing failure. Care should be exercised against overgreasing.

B. Change of Lubricant

Motor must be disassembled as necessary to gain full access to bearing housing(s).

Remove all old grease from bearings and housings (including all grease fill and drain holes). Inspect and replace damaged bearings. Fill bearing housings both inboard and outboard of bearing approximately 30 percent full of new grease. Grease fill ports must be completely charged with new grease. Inject new grease into bearing between rolling elements to fill bearing. Remove excess grease extending beyond the edges of the bearing races and retainers.

Table 1
Recommended Grease Replenishment Quantities & Lubrication Intervals

Bearing Number		Grease Replenishment Quantity (Fl.Oz.)	Lubrication Interval		
62xx, 72xx	63xx, 73xx		1801 thru 3600 RPM	1201 thru 1800 RPM	1200 RPM and slower
03 thru 07	03 thru 06	0.2	1 Year	2 Years	2 Years
08 thru 12	07 thru 09	0.4	6 Months	1 Year	1 Year
13 thru 15	10 thru 11	0.6	6 Months	1 Year	1 Year
16 thru 20	12 thru 15	1.0	3 Months	6 Months	6 Months
21 thru 28	16 thru 20	1.8	3 Months	6 Months	6 Months

Refer to motor nameplate for bearings provided on a specific motor. For bearings not listed in Table 1, the amount of grease required may be calculated by the formula:

$G = 0.11 \times D \times B$

Where: G = Quantity of grease in fluid ounces.
D = Outside diameter of bearing in inches.
B = Width of bearing in inches.

Table 2
Recommended Greases

Motor Frame Size	Motor Enclosure	Grease Manufacturer	Grease (NLGI Grade 2)
All Thru 447	All	Chevron USA, Inc. Exxon Mobil	Grease No. 83343 SRI No. 2 Polyrex-EM
449 and Up	Open Dripproof		
449 and Up	TEFC and Explosionproof	Exxon Mobil	Grease No. 974420 Mobilith SHC-100

The above greases are interchangeable with the grease provided in units supplied from the factory (unless stated otherwise on motor lubrication nameplate).

Table 3
Emerson Motor Co. Recommended Oil Viscosities

Angular Contact Thrust Bearing (7XXX Series)					
Motor Enclosure	**Frame Size**	**Speed (RPM)**	**Ambient Temperature**	**ISO VG**	**Base Oil Type**
Open Dripproof or Weather Protected	324 and Larger	All	-15C thru 40C (5-104F)	32	Mineral or Synthetic
			41C thru 50C (105-122F)	68	Synthetic Only
Totally Enclosed or Explosion proof	404 thru 447		-15C thru 40C (5-104F)	32	Mineral or Synthetic
			41C thru 50C (105-122F)	68	Synthetic Only
	449 thru 5811	1801 - 3600	-15C thru 40C (104F)	32	Synthetic Only
		1800 & Below		68	Synthetic Only
		All	41C thru 50C (105-122F)	Refer to Office	
Spherical Roller Thrust Bearing (29XXX Series)					
Motor Enclosure	**Frame Size**	**Speed (RPM)**	**Ambient Temperature**	**ISO VG**	**Base Oil Type**
Open Dripproof or Weather Protected	444 and Larger	1800 and Below	-15C thru 25C (5-77F)	68	Mineral or Synthetic
			6C thru 40C (42-104F)	150	
			41C thru 50C (105-122F)		Synthetic Only
Totally Enclosed or Explosion proof	449 and Larger		-15C thru 25C (5-77F)	68	Mineral or Synthetic
			6C thru 40C (42-104F)	150	Synthetic Only
			41C thru 50C (105-122F)	Refer to Office	

Notes:
1. If lower guide bearing is oil lubricated, it should use the same oil as the thrust bearing.
2. If lower guide bearing is grease-lubricated, refer to TABLE 2 for recommended greases.
3. Refer to Emerson Motor Co. for ambient temperatures other than those listed.

Table 4
Emerson Motor Co. Approved Oil Specifications For Use With Anti-Friction Bearings

Oil Manufacturer	ISO VG 32		ISO VG 68		ISO VG 150	
	Viscocity: 130-165 SSU @ 100F		Viscocity: 284-347 SSU @ 100F		Viscocity: 620-765 SSU @ 100F	
	Mineral Base Oil	**Synthetic Base Oil**	**Mineral Base Oil**	**Synthetic Base Oil**	**Mineral Base Oil**	**Synthetic Base Oil**
Chevron USA, Inc	GST Turbine Oil 32	Tegra 32	GST Turbine Oil 68	Tegra 68	R & O Machine Oil 150	Tegra 150
Conoco Oil Co.	Hydroclear Turbine Oil 32	Syncon 32	Hydroclear Turbine Oil 68	Syncon 68	Hydroclear AW Hyd. Fluid 150	N/A
ExxonMobil	Teresstic 32	Synnestic 32	Teresstic 68	Synnestic 68	Teresstic 150	Synnestic 150
ExxonMobil	DTE Oil Light	SHC 624	DTE Oil Heavy Medium	SHC 626	DTE Oil Extra Heavy	SHC 629
Pennzoil Co., Inc	Pennzbell TO 32	Pennzbell SHD 32	Pennzbell TO 68	Pennzbell SHD 68	Pennzbell TO 150	Pennzbell SHD 150
Phillips Petroleum Co.	Magnus 32	Syndustrial "E" 32	Magnus 68	Syndustrial "E" 68	Magnus 150	N/A
Shell Oil Co.	Tellus 32	Tellus HD Oil AW SHF 32	Tellus 68	Tellus HD Oil AW SHF 68	Tellus 150	N/A
Texaco Lubricants Co.	Regal 32	Cetus PAO 32	Regal 68	Cetus PAO 68	Regal 150	N/A

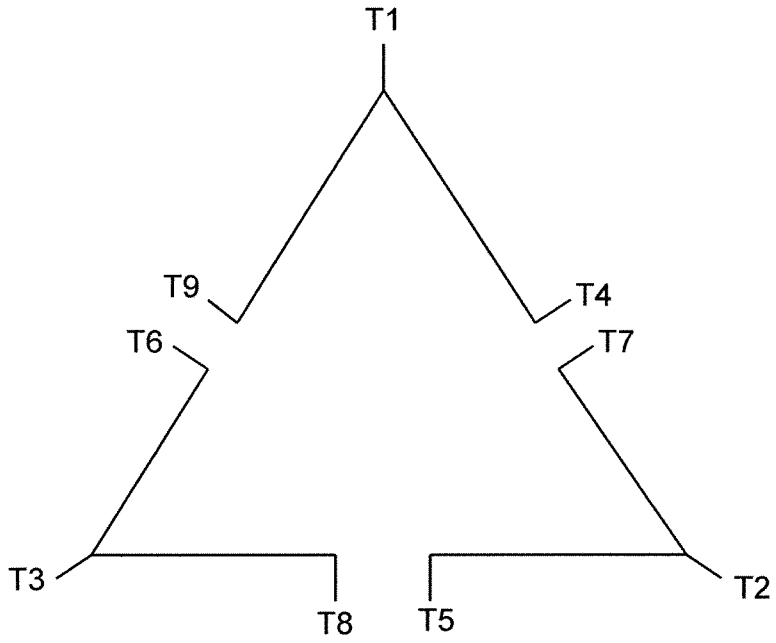
Table 5
Approximate Oil Sump Capacities

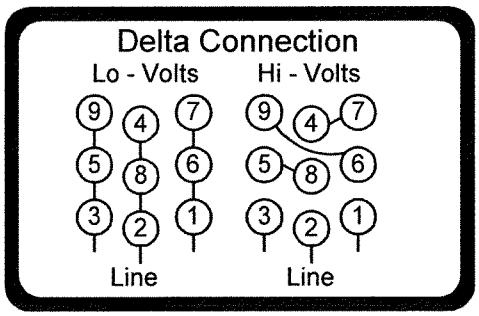
Frame Size	Motor Type Designation (See Motor Nameplate)	Oil Capacity (Quarts)	
		Upper Bearing	Lower Bearing
180 - 280	AU, AV-4	Grease	Grease
180 - 280	AV		
320 - 440	RV		
320 - 360	RV-4, RU	3	
400	RV-4, RU	5	
440	RV-4 (2 pole)	17	
	RV-4, RU (4 pole & slower, w/ang contact thrust brg.)	6	
	(4 pole & slower, w/ spherical thrust brg.)	4	
180 - 440	TV-9, TV, LV-9, LV	Grease	
180 - 360	TV-4, TU, LV-4, LU		
400	TV-4, TU, LV-4, LU	6	
440	TV-4, TU, LV-4, LU	5	
449	JU, JV-4	22	
	HU, HV-4	12	
	JV-3, JV, HV	Grease	
5000	HV, EV, JV, RV	Grease	
	RU, RV-4	30	
	HU, HV-4 (4 pole & slower)	12	
	HV-4 (2 pole only)	20	
	EU, JU, EV-4, JV-4	22	5
5800	HU, HV-4	24	3
	EU, JU, EV-4, JV-4	37	4
6800	HU, HV-4	70	3
	HV (Bow Thruster)	Grease	Grease
	HV (Other Than Bow Thruster)	70	3
8000	RU, RV-4	70	6
	RV	Grease	Grease
9600	RU, RV-4	64	13
	RV	Grease	Grease

A109145

Motor Wiring Diagram

9 Lead, Dual Voltage (DELTA Conn.)





To reverse direction of rotation interchange connections L1 and L2.

Each lead may have one or more cables comprising that lead.
In such case each cable will be marked with the appropriate lead number.

Connection Plate: A109145
Connection Decal: 344122

Standard Paint Specification

For

EM Gray

NIDEC MOTOR CORPORATION
Industrial Motors & Systems Division
Mena, Arkansas

CONTENTS

1.0 Scope

Industrial Motors & Systems Division of Nidec Motor Corporation in Mena, Arkansas (formerly U.S. Electrical Motors) has selected the Hi-Solids enamel paint from "Valspar Corp." for its superior rust inhibitive qualities and durability. The paint also has excellent resistance to various chemicals. This specification covers surface preparation and application of protective coating on motors built in the Mena, Arkansas facility.

2.0 Unpainted Surfaces

The following surfaces will not require protective coating:

Anodized Aluminum	Grounding Pads
Brass	Machined Surfaces
Bronze	Motor Leads
Chromium Plated Metals	Porcelain Enamel Finishes
Copper	Rubber
Galvanized Steel	Stainless Steel
Glass	Vacuum Pressure Impregnated Parts

3.0 Surface Preparation (Cast Iron & Steel)

A. The foundries are required to snag, remove all sand and slag from castings. This is to be immediately followed by primer paint to insure 100% coverage. Primer is to be "Valspar Corp." gray oxide primer (NMC Part No. 999712) or equivalent. Film Thickness: 1 to 3 mils.

B. Prime all castings, in plant, if they have not been primed by the foundry.

C. All parts are to be cleaned prior to priming or finish painting as follows:

1. If parts are dirty – wash and rinse in parts washer.
2. If parts are oily or greasy – clean in a phosphate dip degrease system and rinse in parts washer.
3. If parts are rusty – grit blast to commercial grade.
4. Welded fabricated assemblies – power wire brush all welds and degrease in the phosphate dip degreaser system and rinse in parts washer.
5. Thoroughly dry all parts prior to priming or finish painting. Primer must be applied immediately after cleaning and drying process.

4.0 Cast Aluminum and Fiberglass Parts

Priming is not required on cast aluminum or fiberglass parts. Oxidation must be removed from aluminum parts with a solvent prior to finish painting. Fiberglass parts (canopy caps) are received with a white pigment in the fiberglass.

5.0 Motor Assembly

After assembling the motor, there may be surfaces that require priming or touch-up prior to final painting. These surfaces are bracket-to-frame register fits, outlet box pads, etc. Spray cans of primer are provided to allow motor assemblers to prime paint unfinished surfaces with two coats of primer. Sufficient drying time must be allowed between primer coats. If surfaces are oily, wash with clean paint thinner using a clean rag to prevent contamination of other surfaces.

6.0 General

A. Finished coating shall not be applied to wet or damp surfaces.
B. All coatings shall be applied in a conscientious manner and in accordance with the written application instructions of the coating manufacturer.
C. Re-application time between coats shall be in accordance with the coating manufacturer's recommendation corresponding to the conditions of temperature and humidity.
D. Hardware trim and other items not requiring coating may be removed as required for proper application of coatings. Such items shall be replaced after completion of work.
E. The dry film thickness of each coat, and of the entire system, shall follow the coating manufacturer's recommendation and this specification. The number of coats specified shall be a minimum number of coats to achieve the specified film thickness.
F. Coverage rates, as calculated by the coating manufacturer, shall be considered as the maximum allowable.
G. All spraying equipment shall be maintained in good working order, with daily inspection, and shall be in conformity with the coating manufacturer's most recent application specification.

7.0 Finish Top Coating

All motor products must be clean and free of any dirt, oil or grease on the primed surface prior to finish painting. Except where otherwise specified, thinners shall not be used. Motors will be painted with one coat unless otherwise noted. Film thickness: 2 to 4 mils.

8.0 Final Finish Inspection

Visual inspection of completed work shall be performed on the finished motor by the Quality Assurance Department. The final surface finish is to be in accordance with industry standards for comparable equipment. Any surfaces found in violation of this specification will be rejected and will require rework. Acceptance or rejection of final finish paint is the sole responsibility of the Quality Assurance Department.

9.0 Material Identification

A. Standard Primer

NMC P/N 999712
GRAY OXIDE PRIMER
VALSPAR CORP.
#5410-E-10009
ALKYD-HI SOLIDS, FAST DRY

Alternate Primer Vendor:
SHERWIN-WILLIAMS
GRAY ALKYD B50AZ6
KEM KROMIK
UNIVERSAL METAL PRIMER

B. Standard Finish Paint

NMC P/N 138538
EM GRAY 3.5 VOC H/S ENAMEL
VALSPAR CORP.
AAA1024 DURASPAR 430
ALKYD-HI SOLIDS, FAST DRY
COLOR: BLUE-GRAY, PANTONE PMS 433C

NIDEC MOTOR CORPORATION
8050 W. Florissant Avenue | St Louis, MO 63136
www.nidec-motor.com | www.usmotors.com

Valspar

TECHNICAL DATA

Product Line: Duraspar 430

Product Number: AAA1024

Product Description: EM Gray 3.5 VOC H/S Enamel

Physical Properties:

Viscosity (#2 EZ Zahn @ 77F):	30-35 seconds
Weight Per Gallon (Theoretical):	9.44 lbs./gallon
Solids by Weight (Theoretical):	58.59%
Solids by Volume (Theoretical):	44.33%
VOC:	3.25 lbs./gallon maximum
HAPs Content:	.0894 lbs./solid gallon

Application Recommendations:

Substrate/Pretreatment:	Steel / Iron Phosphate
Reduction:	As needed
Reduction Solvent:	Acetone
Application:	Spray
Clean-Up Solvent:	Ketones
Cure Cycle:	Air Dry

Film Properties:

Dry Film Thickness:	0.8 – 1.2 mils
Gloss (60 degrees):	80 minimum
Coverage @ 1 mil DFT:	711 sq. ft./gallon

Issue Date: September 2002

The Valspar Corporation, Minneapolis, MN 1-800-328-8044

TECHNICAL DATA

Product Number: **5410E10009**

Product Description: **Gray Solvent Primer USEM Part# 999-712**

Physical Properties:

Viscosity (#3 EZ @ 77F):	15-20 seconds
Weight Per Gallon (Theoretical):	10.01 lbs./gallon
Solids by Weight (Theoretical):	56.18%
Solids by Volume (Theoretical):	36.00%
VOC (Theoretical):	4.39lbs./gallon maximum
HAPs Content:	6.976 lbs./solid gallon

Application Recommendations:

Substrate/Pretreatment:	Steel / Iron Phosphate
Reduction:	As needed
Reduction Solvent:	Aromatics
Application:	Air Spray
Clean-Up Solvent:	Aromatics (Xylene)
Cure Cycle:	Air Dry

Film Properties:

Dry Film Thickness:	0.9-1.1 mils
Gloss (60 degrees):	5 maximum
Coverage @ 1 mil DFT:	577.4 sq. ft./gallon

Issue Date: April 2003

The Valspar Corporation, Minneapolis, MN **1-800-328-8044**

Industrial & Marine Coatings

2.11

KEM KROMIK®
UNIVERSAL METAL PRIMER

B50NZ6 BROWN B50WZ1 OFF WHITE
B50AZ6 GRAY

PRODUCT INFORMATION

Revised 4/05

PRODUCT DESCRIPTION

KEM KROMIK UNIVERSAL METAL PRIMER is a rust inhibiting, low VOC, modified alkyd resin primer designed for use over iron and steel substrates. Can be used as a "universal" primer under high performance topcoats and is also suitable as a "barrier" coat over conventional coatings which would normally be attacked by strong solvents in high performance coatings.

- High film build
- Corrosion resistant
- Can be topcoated with epoxies and urethanes
- Apply down to 40°F

RECOMMENDED USES

For use over prepared steel.

- "Universal" primer
- Shopcoat primer
- "Barrier" coating
- Maintenance primer
- Interior / exterior metal primer
- Structural steel
- Equipment / machinery
- Marine vessels
- Hand rails
- Conforms to AWWA D102-03, OCS #1
- Suitable for use in USDA inspected facilities

PRODUCT CHARACTERISTICS

Finish: Flat

Color: Brown, Off White, Gray

Volume Solids: 53% ± 2%

Weight Solids: 73% ± 2%

VOC (EPA Method 24): <420 g/L, 3.5 lb/gal, Off White

Recommended Spreading Rate per coat:

Wet mils:	6.0 - 8.0
Dry mils:	3.0 - 4.0
Coverage:	212 - 283 sq ft/gal approximate

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 6.0 mils wet @ 50% RH:

	@ 40°F	@ 77°F	@ 110°F
To touch:	2 hours	30 minutes	15 minutes
Tack free:	2½ hours	1 hour	20 minutes
To recoat with itself and alkyds:	2½ hours	1 hour	45 minutes
To recoat with high performance/hot solvent topcoats:	36 hours	16 hours	16 hours
To cure:	7 days	7 days	7 days

Note: For maximum adhesion, acrylic topcoats require 48-72 hours drying of primer.

Drying time is temperature, humidity, and film thickness dependent.

Shelf Life: 36 months, unopened
Store indoors at 40°F to 100°F.

Flash Point: 80°F, PMCC

Reducer: Not recommended

Clean Up: Xylene, R2K4

PERFORMANCE CHARACTERISTICS

System Tested: (unless otherwise indicated)
Substrate: Steel
Surface Preparation: SSPC-SP6
1 ct. Kem Kromik Universal @ 3.0 mils dft

Abrasion Resistance:
Method: ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load
Result: 250 mg loss

Adhesion:
Method: ASTM D4541
Result: 260 psi

Direct Impact Resistance:
Method: ASTM D2794
Result: 70 in. lbs.

Dry Heat Resistance:
Method: ASTM D2485
Result: 200°F

Flexibility:
Method: ASTM D522, 180° bend, 1/4" mandrel
Result: Passes

Moisture Condensation Resistance:
Method: ASTM D4585, 100°F, 500 hours
Result: Good

Pencil Hardness:
Method: ASTM D3363
Result: H

Salt Fog Resistance:
Method: ASTM B117, 500 hours
Result: Good

Thermal Shock:
Method: ASTM D2246, 5 cycles
Result: Passes

Provides performance comparable to products formulated to federal specifications: TT-P-664D.

continued on back

Industrial & Marine Coatings

2.11

KEM KROMIK® UNIVERSAL METAL PRIMER

B50NZ6 BROWN B50WZ1 OFF WHITE
B50AZ6 GRAY

PRODUCT INFORMATION

RECOMMENDED SYSTEMS

Steel, Alkyd Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Industrial Enamel HS @ 2.0 - 4.0 mils dft/ct
or WB Industrial Enamel @ 1.5 - 3.0 mils dft/ct
or Steel Spec Fast Dry Alkyd @ 3.0 - 5.0 mils dft/ct

Steel, Aluminum Finish:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Silver-Brite Aluminum @ 1.0 - 1.5 mils dft/ct

Steel, Acrylic Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. DTM Acrylic Coating @ 2.5 - 4.0 mils dft/ct
or Sher-Cryl HPA @ 2.5 - 4.0 mils dft/ct

Steel, Epoxy Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Tile-Clad HS Epoxy @ 2.5 - 4.0 mils dft/ct

Steel, Polyurethane Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Hi-Solids Polyurethane @ 3.0 - 4.0 mils dft/ct
or Polylon 1900 Polyurethane @ 2.0 - 3.0 mils dft/ct

Steel, Silicone Alkyd Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Steel Master 9500 @ 2.5 - 4.0 mils dft/ct

Steel, Water Based Epoxy Topcoat:
1 ct. Kem Kromik Universal Metal Primer @ 3.0 - 4.0 mils dft
1-2 cts. Water Based Catalyzed Epoxy @ 2.5 - 4.0 mils dft/ct
or Waterbased Tile Clad Epoxy @ 2.0 - 4.0 mils dft/ct

The systems listed above are representative of the product's use. Other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:
Iron & Steel: SSPC-SP2

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature:	40°F minimum, 120°F maximum (air, surface, and material)
	At least 5°F above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:	1 and 5 gallon containers
Weight per gallon:	12.5 ± 0.35 lb, may vary with color

SAFETY PRECAUTIONS

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Industrial & Marine Coatings

2.11A

KEM KROMIK® UNIVERSAL METAL PRIMER

B50NZ6 Brown B50WZ1 Off White
B50AZ6 Gray

APPLICATION BULLETIN

Revised 4/05

Surface Preparation

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel
Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). Prime any bare steel within 8 hours or before flash rusting occurs.

Previously Painted Surfaces
If in sound condition, clean the surface of all foreign material. Smooth, hard, or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

As a "Barrier" Coat:
It if is necessary to topcoat a previously painted surface with chemically resistant or strong solvent topcoats, Kem Kromik Universal Metal Primer can be used as a barrier coat to prevent lifting. Apply a coat of Kem Kromik Universal Metal Primer to a small area to test for adhesion or bleeding. If there is evidence of either poor adhesion or bleeding, clean surface to bare substrate and apply recommended system.

Application Conditions

Temperature:	40°F minimum, 120°F maximum (air, surface, and material) At least 5°F above dew point
Relative humidity:	85% maximum

Application Equipment

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer ..... Not recommended

Clean Up ..... Xylene, R2K4

Airless Spray
Pressure ..... 1800-3000 psi
Hose ..... 1/4" ID
Tip ..... .015" - .019"
Filter ..... 60 mesh

Conventional Spray
Gun ..... Binks 95
Fluid Nozzle 63C
Air Nozzle 63PB
Atomization Pressure ... 50 psi
Fluid Pressure ..... 15-20 psi

Brush
Brush ..... Natural Bristle

Roller
Cover ..... 3/8" woven with phenolic core

If specific application equipment is not listed above, equivalent equipment may be substituted.

continued on back

Industrial & Marine Coatings

2.11A

KEM KROMIK® UNIVERSAL METAL PRIMER

B50NZ6 BROWN **B50WZ1** OFF WHITE
B50AZ6 GRAY

APPLICATION BULLETIN

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Mix paint thoroughly by boxing and stirring before use.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

Wet mils:	6.0 - 8.0
Dry mils:	3.0 - 4.0
Coverage:	212 - 283 sq ft/gal approximate

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 6.0 mils wet @ 50% RH:

	@ 40°F	@ 77°F	@ 110°F
To touch:	2 hours	30 minutes	15 minutes
Tack free:	2½ hours	1 hour	20 minutes
To recoat with itself and alkyds:	2½ hours	1 hour	45 minutes
To recoat with high performance/hot solvent topcoats:	36 hours	16 hours	16 hours
To cure:	7 days	7 days	7 days

Note: For maximum adhesion, acrylic topcoats require 48 - 72 hours drying of primer.

Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

No reduction of material is recommended as it can affect film build, appearance, and adhesion.

Intimate contact with the steel surface and primer is necessary for adequate rust inhibition and adhesion.

Refer to Product Information sheet for additional performance characteristics and properties.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Xylene, R2K4. Clean tools immediately after use with Xylene, R2K4. Follow manufacturer's safety recommendations when using any solvent.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

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The Valspar Corporation
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Material Identification

Product ID: **5410E10009**
Product Name: GRY SOLV PR USEM PART 26-Y-4)
Product Use: Paint product.
Date Published: 2003/10/22
Revision Date: 2003/01/10

Company Identification
The Valspar Corporation
1101 Third Street South
Minneapolis, MN 55415
Manufacturer's Phone: 1-612-332-7371

24-Hour Medical Emergency Phone: 1-888-345-5732

2. COMPOSITION / INFORMATION ON HAZARDOUS INGREDIENTS

Common Name CAS #	Approx Wt%	Chemical name
TALC 14807-96-6	15 - 20	TALC (MG3H2(SI03)4)
VM&P NAPHTHA 64742-89-8	10 - 15	Solvent naphtha (petroleum), light aliphatic
XYLENE 1330-20-7	10 - 15	Xylenes (o-, m-, p- isomers)
Trade Secret : PROPRIETARY PIGMENT	10 - 15	PROPRIETARY PIGMENT
TOLUENE 108-88-3	5 - 10	Toluene
ISOBUTYL ALCOHOL 78-83-1	1 - 5	Isobutyl alcohol
ETHYLBENZENE 100-41-4	1 - 5	Ethyl benzene
ZINC OXIDE PIGMENT 1314-13-2	1 - 5	Zinc oxide
CARBON BLACK 1333-86-4	1 - 5	Carbon black
CRYSTALLINE SILICA 14808-60-7	.1 - 1	QUARTZ (Si02)

If this section is blank there are no hazardous components per OSHA guidelines.

3. HAZARDS IDENTIFICATION

Primary Routes of Exposure:
Inhalation
Ingestion
Skin absorption

Emergency Overview:
This section not in use.

This product contains ingredients that may contribute to the following potential acute health effects:

Inhalation Effects:
Harmful if inhaled. May affect the brain, nervous system, or respiratory system, causing dizziness, headache, nausea or respiratory irritation. May cause Metal Fume Fever which is characterized by chills, fever, aching muscles, dryness and metal taste in mouth and throat, headaches, sneezing, nausea, and irritation of the nose and trachea.

Eye Contact:
Corneal Injury/eye damage. May cause eye burns.

Skin Contact:
May cause moderate skin irritation.

Acute Ingestion:
None known

Other Effects:
May cause central nervous system depression. May cause kidney damage. May cause liver damage.

This product contains ingredients that may contribute to the following potential chronic health effects:

Notice: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Prolonged exposure to respirable crystalline quartz silica may cause delayed chronic injury (silicosis).Possible birth defects hazard. Contains ingredients which may cause birth defects based on animal data. Possible cancer hazard. Contains ingredients which may cause cancer based on animal data. Risk of cancer depends on duration and level of exposure. May cause liver damage. May cause kidney damage.

See Section 11 for toxicological information about Mutagens, Teratogens and Carcinogens.

If this section is blank, no information is available.

4. FIRST AID MEASURES

Inhalation:
If affected by inhalation, move victim to fresh air. If symptoms persist, seek medical attention. If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Eye Contact:
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. If irritation persists get medical attention.

Ingestion:
If swallowed , do not induce vomiting. Give large quantities of water. If available, give several glasses of milk. Never give anything by mouth to an unconscious person. Get medical attention immediately. If swallowed, get medical attention immediately. Get immediate medical attention.

Medical conditions aggravated by exposure: Any respiratory or skin condition.

5. FIRE FIGHTING MEASURES

Flash point (Fahrenheit):	70° F (21° C) TCC/PM
Lower explosive limit:	1 %
Upper explosive limit:	12 %
Autoignition temperature:	Not available.° F (° C)
Sensitivity to impact:	No.
Sensitivity to static discharge:	Subject to static discharge hazards. Please see bonding and grounding information in Section 7.
Hazardous combustion products:	See Section 10.

Unusual fire and explosion hazards:
Contaminated rags, wipes, saw dust, etc., may catch fire spontaneously. Store waste under water in closed metal containers until disposed of in compliance with applicable regulations. Contains oxidizable materials.

Extinguishing media:
Carbon dioxide, dry chemical, foam and/or water fog.

Fire fighting procedures:
Use water spray to cool nearby containers and structures exposed to fire. Firefighters should be equipped with self-contained breathing apparatus and turn out gear.

6. ACCIDENTAL RELEASE MEASURES

Action to be taken if material is released or spilled:
Ventilate area. Avoid breathing of vapors. Use self-containing breathing apparatus or airmask for large spills in a confined area. Wipe, scrape or soak up in an inert material and put in a container for disposal. See section 5, "Unusual Fire and Explosion Hazards", for proper container and storage procedures. Remove sources of ignition. Remove with inert absorbent and non sparking tools. Avoid contact with eyes.

7. HANDLING AND STORAGE

Precautions to be taken in handling and storage:
Keep away from heat, sparks, and flames. Keep container closed when not in use. Do not store above 120 degrees F. (49 degrees C). Based on flash point and vapor pressure, suitable storage should be provided in accordance with OSHA regulation 1910.106, Ontario OH&S regulation 851 section 22. If the product is used near or above the flashpoint, an ignition hazard may be present. Activities, uses, or operations which liberate vapor (such as mixing or free fall of liquids) may also present an ignition hazard. Please ensure containers and other interconnected equipment are properly bonded and grounded at all times. Empty containers may contain product residue, including flammable or explosive vapors. Do not cut, puncture or weld on or near container. All label warnings must be observed until the container has been commercially cleaned or reconditioned.

8. PERSONAL PROTECTIVE EQUIPMENT AND EXPOSURE CONTROLS

Personal Protective Equipment

Eye and face protection:
Avoid contact with eyes. Wear chemical goggles if there is the possibility of contact or splashing in the eye.

Skin protection:
Appropriate chemical resistant gloves should be worn.To prevent skin contact wear protective clothing covering all exposed areas.

Respiratory protection:
If exposure cannot be controlled below applicable limits, use the appropriate NIOSH approved respirator such as an air purifying respirator with organic vapor cartridge and dust/mist filter. Consult the respirator manufacturer's literature to ensure that the respirator will provide adequate protection. Read and follow all respirator manufacturer's instructions.

Ventilation
Required when spraying or applying in confined area. Ventilation equipment should be explosion proof. Eliminate ignition sources.

Exposure Guidelines

OSHA Permissible Exposure Limits (PEL's)

Common Name CAS #	Approx Wt%	TWA (final)	Ceilings limits (final)	Skin designations
TALC 14807-96-6	15 - 20	see Table Z-3		
XYLENE 1330-20-7	10 - 15	100 ppm TWA; 435 mg/m3 TWA		
Trade Secret : PROPRIETARY PIGMENT	10 - 15	15 mg/m3 TWA (total dust)		
TOLUENE 108-88-3	5 - 10	200 ppm TWA; C 300 ppm	C 300 ppm	
ISOBUTYL ALCOHOL 78-83-1	1 - 5	100 ppm TWA; 300 mg/m3 TWA		
ETHYLBENZENE 100-41-4	1 - 5	100 ppm TWA; 435 mg/m3 TWA		
ZINC OXIDE PIGMENT 1314-13-2	1 - 5	5 mg/m3 TWA (fume); 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)		
CARBON BLACK 1333-86-4	1 - 5	3.5 mg/m3 TWA		
CRYSTALLINE SILICA 14808-60-7	.1 - 1	see Table Z-3		

ACGIH Threshold Limit Value (TLV's)

Common Name CAS #	Approx Wt%	TWA	STEL	Ceiling limits	Skin designations

TALC 14807-96-6	15 - 20	2 mg/m3 TWA (this TLV is for the respirable fraction of dust for Talc containing no asbestos and <1% crystalline silica)			
VM&P NAPHTHA 64742-89-8	10 - 15	420 PPM			
XYLENE 1330-20-7	10 - 15	100 ppm TWA	150 ppm STEL		
Trade Secret : PROPRIETARY PIGMENT	10 - 15	10 mg/m3 TWA			
TOLUENE 108-88-3	5 - 10	50 ppm TWA			skin - potential for cutaneous absorption
ISOBUTYL ALCOHOL 78-83-1	1 - 5	50 ppm TWA			
ETHYLBENZENE 100-41-4	1 - 5	100 ppm TWA	125 ppm STEL		
ZINC OXIDE PIGMENT 1314-13-2	1 - 5	5 mg/m3 TWA (fume); 10 mg/m3 TWA (dust) (The value for Zinc oxide 'dust' is for total dust containing no asbestos and < 1% crystalline silica)	10 mg/m3 STEL (fume)		
CARBON BLACK 1333-86-4	1 - 5	3.5 mg/m3 TWA			
CRYSTALLINE SILICA 14808-60-7	.1 - 1	0.05 mg/m3 TWA (this TLV is for the respirable fraction of dust)			

If this section is blank, no information is available.

9. PHYSICAL PROPERTIES

Odor:	Normal for this product type.
Physical State:	Liquid
pH:	Not determined.
Vapor pressure:	28 mmHG @ 100° F (38° C)
Vapor density (air = 1.0):	3.8
Boiling point:	211° F (99° C)
Solubility in water:	Insoluble.
Coefficient of water/oil distribution:	Not determined.
Density (weight per gallon):	9.989
Specific gravity (water = 1):	1.19
Evaporation rate (butyl acetate = 1.0):	2

10. STABILITY AND REACTIVITY

Stability:	This product is stable.
Conditions to Avoid:	None known.
Incompatibility:	Strong oxidizers.
Hazardous Polymerization:	None anticipated.
Hazardous Decomposition Products:	Silicon dioxide. Carbon monoxide and carbon dioxide. Metal oxide fumes.

Sensitivity to static discharge: Subject to static discharge hazards. Please see bonding and grounding information in Section 7.

11. TOXICOLOGICAL INFORMATION

Common Name CAS #	Approx Wt%	Calif- Prop. 65. Developmental Toxicity	California Prop 65 - reproductive male
TOLUENE 108-88-3	5 - 10	developmental toxicity; initial date 1/1/91	

Contains ethylbenzene, which has been determined by NTP to be an animal carcinogen with no known relevance to humans. IARC has classified ethylbenzene as possibly carcinogenic to humans (2b) on the basis of sufficient evidence of carcinogenicity in laboratory animals but inadequate evidence of cancer in humans. Contains crystaline silica. The IARC has determined that crystaline silica inhaled in the form of quartz or cristobablite from occupational sources is carcinogenic to humans (group 1). Refer to IARC monograph 68 in conjunction with the use of these materials. Risk of cancer depends on the duration and level of exposure. In coatings products, risk is due primarily to inhalation of sanding dusts or respirable particles in spray mists. The NTP has also determined that crystaline silica is a known human carcinogen in the form of fine, breathable particles. Risk of cancer depends on duration and level of exposure in coatings products, risk is due primarily to inhalation of sanding dust or respirable particles in spray mist.

Common Name CAS #	Approx Wt%	IARC Group 1 - Human Evidence	IARC Group 2A - limited human data	IARC Group 2b - sufficient animal data
ETHYLBENZENE 100-41-4	1 - 5			Monograph 77, 2000
CARBON BLACK 1333-86-4	1 - 5			Monograph 65, 1996
CRYSTALLINE SILICA 14808-60-7	.1 - 1	Monograph 68, 1997; (inhaled in the form of quartz or cristobalite from occupational sources)		

Common Name CAS #	Approx Wt%	NTP Known carcinogens	NTP Suspect carcinogens	NTP Evidence of carcinogenicity
TALC 14807-96-6	15 - 20			male rat-some evidence; female rat-clear evidence; male mice-no evidence; female mice-no evidence
TOLUENE 108-88-3	5 - 10			MALE RAT - NO EVIDENCE; FEMALE RAT - NO EVIDENCE; MALE MICE - NO EVIDENCE; FEMALE MICE - NO EVIDENCE.

ETHYLBENZENE 100-41-4	1 - 5			male rat-clear evidence; female rat-some evidence; male mice-some evidence; female mice-some evidence
CRYSTALLINE SILICA 14808-60-7	.1 - 1	Known Carcinogen		

Common Name **CAS #**	**Approx Wt%**	**OSHA Select carcinogens**	**OSHA Possible select carcinogens**	**ACGIH Carcinogens**
TOLUENE 108-88-3	5 - 10			A4 - Not Classifiable as a Human Carcinogen
ETHYLBENZENE 100-41-4	1 - 5		Monograph 77, 2000 IARC - Group 2B (Possibly carcinogenic to humans)	
CARBON BLACK 1333-86-4	1 - 5		Monograph 65, 1996 IARC - Group 2B (Possibly carcinogenic to humans)	A4 - Not Classifiable as a Human Carcinogen
CRYSTALLINE SILICA 14808-60-7	.1 - 1			A2 - Suspected Human Carcinogen

If this section is blank, no information is available.

12. ECOLOGICAL DATA

Not available at this time.

13. DISPOSAL CONSIDERATIONS

Disposal should be made in accordance with federal, state and local regulations.

14. TRANSPORTATION INFORMATION

U.S. Department of Transportation

Proper Shipping Name: PAINT
Hazard Class: 3
UN ID Number: UN1263
Packing Group: II

49 CFR Hazardous Material Regulations Parts 100-180

THIS PRODUCT CONTAINS THE FOLLOWING HAZARDOUS SUBSTANCES IN REPORTABLE QUANTITIES . NOT ALL SIZES ARE SUBJECT TO THE RQ REQUIREMENTS. PLEASE CONTACT THE SUPPLIER FOR FURTHER SHIPPING INFORMATION.

Reportable Quantity Description: XYLENE

International Air Transport Association:

Proper Shipping Name: PAINT
Hazard Class: 3

UN ID Number: UN1263
Packing Group: II

International Maritime Organization:
Proper Shipping Name: PAINT
Hazard Class: 3
UN ID Number: UN1263
Packing Group: II

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

Common Name CAS #	Approx Wt%	SARA 302	SARA 313	CERCLA RQ IN LBS.
TALC 14807-96-6	15 - 20			
VM&P NAPHTHA 64742-89-8	10 - 15			
XYLENE 1330-20-7	10 - 15		form R reporting required for 1.0% de minimis concentration	100
Trade Secret : PROPRIETARY PIGMENT	10 - 15			
TOLUENE 108-88-3	5 - 10		form R reporting required for 1.0% de minimis concentration	1000
ISOBUTYL ALCOHOL 78-83-1	1 - 5			5000
ETHYLBENZENE 100-41-4	1 - 5		form R reporting required for 1.0% de minimis concentration	1000
ZINC OXIDE PIGMENT 1314-13-2	1 - 5		YES	
CARBON BLACK 1333-86-4	1 - 5			
CRYSTALLINE SILICA 14808-60-7	.1 - 1			

SARA 311/312 Hazard Class:
Acute: Yes
Chronic: Yes
Flammability: Yes
Reactivity: No
Sudden Pressure: No

U.S. STATE REGULATIONS:

Pennsylvania Right To Know:

TALC	14807-96-6
CARBON BLACK	1333-86-4
PROPRIETARY PIGMENT	Trade Secret
ZINC OXIDE PIGMENT	1314-13-2

ISOBUTYL ALCOHOL	78-83-1
VM&P NAPHTHA	64742-89-8
TOLUENE	108-88-3
ETHYLBENZENE	100-41-4
XYLENE	1330-20-7

Additional Non-Hazardous Materials

PROPRIETARY RESIN	Trade Secret

California Proposition 65:
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Rule 66 status of product Photochemically reactive.

INTERNATIONAL REGULATIONS - Chemical Inventories

TSCA Inventory: All components of this product are in compliance with U.S. TSCA Chemical Substance Inventory Requirements.

Canada Domestic Substances List: Not all components in this product are listed on the Domestic Substances List.

16. OTHER INFORMATION

HMIS Codes

Health:	2
Flammability:	3
Reactivity:	1
PPE:	X - See Section 8 for Personal Protective Equipment (PPE).

Abbreviations:
OSHA - Occupational Safety and Health Administration, IARC - International Agency for Research on Cancer, NIOSH - National Institute of Occupational Safety and Health, NTP - National Toxicology Program, ACGIH - American Conference of Governmental Industrial Hygienists, SCAQMD - South Coast Air Quality Management District, TSCA - Toxic Substances Control Act, IATA - International Air Transport Association, IMO - International Maritime Organization, DOT - Department of Transportation, NA - Not applicable, NOT ESTAB - Not established, N.A.V. - Not available, RQ - Reportable quantity, WT - Weight, MG/CU M - Milligrams per cubic meter, G/L - Grams per liter, MM - Millimeters, MPPCF - Millions of particles per cubic foot, PPM - parts per million, PPT - parts per thousand, TCC/PM - Tag closed cup / Pensky-Martens, PB - Lead, PEL - Permissible exposure level, TWA - Time Weighted Average, STEL - Short term exposure limit, C - Celsius, F - Fahrenheit.

Disclaimer:
The data on this sheet represent typical values. Since application variables are a major factor in product performance, this information should serve only as a general guide. Valspar assumes no obligation or liability for use of this information. UNLESS VALSPAR AGREES OTHERWISE IN WRITING, VALSPAR MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR FREEDOM FROM PATENT INFRINGEMENT. VALSPAR WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Your only remedy for any defect in this product is the replacement of the defective product, or a refund of its purchase price, at our option. This MSDS contains additional information required by the state of Pennsylvania.

MATERIAL SAFETY DATA SHEET

B50AZ6
06 00

DATE OF PREPARATION
Jan 10, 2010

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER
B50AZ6

PRODUCT NAME
KEM KROMIK® Universal Metal Primer (VOC Comp.), Gray

MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	www.sherwin-williams.com
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
**for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)*	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
4	**100-41-4**	**Ethylbenzene**		
		ACGIH TLV	100 PPM	7.1 mm
		ACGIH TLV	125 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	125 PPM STEL	
21	**1330-20-7**	**Xylene**		
		ACGIH TLV	100 PPM	5.9 mm
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
0.2	**14808-60-7**	**Quartz**		
		ACGIH TLV	0.025 mg/m3 as Resp. Dust	
		OSHA PEL	0.1 mg/m3 as Resp. Dust	
5	**14807-96-6**	**Talc**		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
38	**471-34-1**	**Calcium Carbonate**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	15 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
9	**13463-67-7**	**Titanium Dioxide**		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
0.2	**1333-86-4**	**Carbon Black**		
		ACGIH TLV	3.5 MG/M3	
		OSHA PEL	3.5 MG/M3	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE
INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE
EYES: Irritation.
SKIN: Prolonged or repeated exposure may cause irritation.
INHALATION: Irritation of the upper respiratory system.

HMIS Codes

Health	2*
Flammability	3
Reactivity	0

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.
Prolonged overexposure to solvent ingredients in Section 2 may cause adverse effects to the liver, urinary and reproductive systems.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.
Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.
SKIN: Wash affected area thoroughly with soap and water.
Remove contaminated clothing and launder before re-use.
INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.
INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
80 °F PMCC	1.0	7.0	RED LABEL -- Flammable, Flash below 100 °F (38 °C)

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.
Application to hot surfaces requires special precautions.
During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.
Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

- Remove all sources of ignition. Ventilate the area.
- Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class IC

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are FLAMMABLE. Keep away from heat, sparks, and open flame.
During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition.
Consult NFPA Code. Use approved Bonding and Grounding procedures.
Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.
Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.
Wash hands after using.
This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m3 (total dust), 3 mg/m3 (respirable fraction), OSHA PEL 15 mg/m3 (total dust), 5 mg/m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	12.68 lb/gal	1519 g/l
SPECIFIC GRAVITY	1.53	
BOILING POINT	277 - 292 °F	136 - 144 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	46%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	

VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)

3.32lb/gal	398g/l	Less Water and Federally Exempt Solvents
3.32lb/gal	398g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

Ethylbenzene is classified by IARC as possibly carcinogenic to humans (2B) based on inadequate evidence in humans and sufficient evidence in laboratory animals. Lifetime inhalation exposure of rats and mice to high ethylbenzene concentrations resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations. There is no evidence that ethylbenzene causes cancer in humans.

Crystalline Silica (Quartz, Cristobalite) is listed by IARC and NTP. Long term exposure to high levels of silica dust, which can occur only when sanding or abrading the dry film, may cause lung damage (silicosis) and possibly cancer.

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

Carbon Black is classified by IARC as possibly carcinogenic to humans (group 2B) based on experimental animal data, however, there is insufficient evidence in humans for its carcinogenicity.

TOXICOLOGY DATA

CAS No.	Ingredient Name			
100-41-4	Ethylbenzene			
		LC50 RAT	4HR	Not Available
		LD50 RAT		3500 mg/kg
1330-20-7	Xylene			
		LC50 RAT	4HR	5000 ppm
		LD50 RAT		4300 mg/kg
14808-60-7	Quartz			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available
14807-96-6	Talc			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available
471-34-1	Calcium Carbonate			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available
13463-67-7	Titanium Dioxide			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available
1333-86-4	Carbon Black			
		LC50 RAT	4HR	Not Available
		LD50 RAT		Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.
Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers.
Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

US Ground (DOT)

1 Gallon and Less may be Classed as CONSUMER COMMODITY, ORM-D
Larger Containers are Regulated as:
UN1263, PAINT, 3, PG III, (ERG#128)

DOT (Dept of Transportation) Hazardous Substances & Reportable Quantities

Ethyl benzene 1000 lb RQ
Xylenes (isomers and mixture) 100 lb RQ

Bulk Containers may be Shipped as (check reportable quantities):

RQ, UN1263, PAINT, 3, PG III, (XYLENES (ISOMERS AND MIXTURE)), (ERG#128)

Canada (TDG)

UN1263, PAINT, CLASS 3, PG III, LIMITED QUANTITY, (ERG#128)

IMO

UN1263, PAINT, CLASS 3, PG III, (27 C c.c.), EmS F-E, S-E, ADR (D/E)

SECTION 15 — REGULATORY INFORMATION

SARA 313 *(40 CFR 372.65C)* SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
100-41-4	Ethylbenzene	4	
1330-20-7	Xylene	21	
	Zinc Compound	3	1.6

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

The Valspar Corporation
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Material Identification

Product ID: **AAA1024**
Product Name: DURASPAR 430 EM GRAY 3.5 VOC H/S ENAMEL
Product Use: Paint product.
Date Published: 2003/02/27
Revision Date: 2003/02/27

Company Identification
The Valspar Corporation
1101 Third Street South
Minneapolis, MN 55415
Manufacturer's Phone: 1-612-332-7371

24-Hour Medical Emergency Phone: 1-888-345-5732

2. COMPOSITION / INFORMATION ON HAZARDOUS INGREDIENTS

Common Name CAS #	Approx Wt%	Chemical name
BUTYL ACETATE 123-86-4	20 - 25	n-Butyl acetate
DIMETHYL KETONE 67-64-1	10 - 15	DIMETHYL KETONE
METHYL N-AMYL KETONE 110-43-0	1 - 5	Methyl n-amyl ketone
Trade Secret : PROPRIETARY PIGMENT	1 - 5	PROPRIETARY PIGMENT
METHYL PROPYLKETONE 107-87-9	1 - 5	Methylpropyl ketone
Trade Secret : PROPRIETARY INERT	1 - 5	PROPRIETARY INERT
TERT-BUTYL ACETATE 540-88-5	1 - 5	tert-Butyl acetate
CARBON BLACK 1333-86-4	.1 - 1	Carbon black

If this section is blank there are no hazardous components per OSHA guidelines.

3. HAZARDS IDENTIFICATION

Primary Routes of Exposure:
Inhalation
Ingestion
Skin absorption

Emergency Overview:
This section not in use.

This product contains ingredients that may contribute to the following potential acute health effects:

Inhalation Effects:
Harmful if inhaled. May affect the brain, nervous system, or respiratory system, causing dizziness, headache, nausea or respiratory irritation. Irritates mucous membranes. Causes changes in nasal membranes and metallic taste in mouth. May result in burns of the mucous membranes, bronchospasm, coughing and delayed pulmonary edema.

Eye Contact:
May cause eye burns. Corneal Injury/eye damage.

Skin Contact:
May cause skin burns.

Acute Ingestion:
May cause burns of the mouth, throat and stomach.

Other Effects:
Contains ingredients which are corrosive. Lachrimation. May cause central nervous system depression.

This product contains ingredients that may contribute to the following potential chronic health effects:

Notice: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.Possible cancer hazard. Contains ingredients which may cause cancer based on animal data. Risk of cancer depends on duration and level of exposure.

See Section 11 for toxicological information about Mutagens, Teratogens and Carcinogens.

If this section is blank, no information is available.

4. FIRST AID MEASURES

Inhalation:
If affected by inhalation, move victim to fresh air. If symptoms persist, seek medical attention. If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Eye Contact:
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. If irritation persists get medical attention. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean contaminated shoes. Flush skin with large amounts of water. If irritation persists, get medical attention. Do not use soap

Ingestion:
If swallowed, contact medical personnel immediately to determine best course of action.

Medical conditions aggravated by exposure: Any respiratory or skin condition.

5. FIRE FIGHTING MEASURES

Flash point (Fahrenheit):	1° F (-17° C) TCC/PM
Lower explosive limit:	1 %
Upper explosive limit:	13 %
Autoignition temperature:	Not available.° F (° C)
Sensitivity to impact:	No.
Sensitivity to static discharge:	Subject to static discharge hazards. Please see bonding and grounding information in Section 7.
Hazardous combustion products:	See Section 10.

Unusual fire and explosion hazards:
Contaminated rags, wipes, saw dust, etc., may catch fire spontaneously. Store waste under water in closed metal containers until disposed of in compliance with applicable regulations. Contains oxidizable materials.

Extinguishing media:
Carbon dioxide, dry chemical, foam and/or water fog.

Fire fighting procedures:
Use water spray to cool nearby containers and structures exposed to fire. Firefighters should be equipped with self-contained breathing apparatus and turn out gear.

6. ACCIDENTAL RELEASE MEASURES

Action to be taken if material is released or spilled:
Ventilate area. Avoid breathing of vapors. Use self-containing breathing apparatus or airmask for large spills in a confined area. Wipe, scrape or soak up in an inert material and put in a container for disposal. See section 5, "Unusual Fire and Explosion Hazards", for proper container and storage procedures. Remove sources of ignition. Remove with inert absorbent and non sparking tools. Avoid contact with eyes.

7. HANDLING AND STORAGE

Precautions to be taken in handling and storage:
Keep away from heat, sparks, and flames. Keep container closed when not in use. Do not store above 120 degrees F. (49 degrees C). Based on flash point and vapor pressure, suitable storage should be provided in accordance with OSHA regulation 1910.106, Ontario OH&S regulation 851 section 22. If the product is used near or above the flashpoint, an ignition hazard may be present. Activities, uses, or operations which liberate vapor (such as mixing or free fall of liquids) may also present an ignition hazard. Please ensure containers and other interconnected equipment are properly bonded and grounded at all times. Empty containers may contain product residue, including flammable or explosive vapors. Do not cut, puncture or weld on or near container. All label warnings must be observed until the container has been commercially cleaned or reconditioned.

8. PERSONAL PROTECTIVE EQUIPMENT AND EXPOSURE CONTROLS

Personal Protective Equipment

Eye and face protection:
Avoid contact with eyes. Wear chemical goggles if there is the possibility of contact or splashing in the eye.

Skin protection:

Appropriate chemical resistant gloves should be worn.To prevent skin contact wear protective clothing covering all exposed areas.

Respiratory protection:
Unless air monitoring demonstrates vapor/mist levels above applicable limits, no respirator is required. If respirator is required, the appropriate, properly fitted respirator (NIOSH approved) should be worn during application. Follow respirator manufacturers directions for respirator use.

Ventilation
Required when spraying or applying in confined area. Ventilation equipment should be explosion proof. Eliminate ignition sources.

Exposure Guidelines

OSHA Permissible Exposure Limits (PEL's)

Common Name CAS #	Approx Wt%	TWA (final)	Ceilings limits (final)	Skin designations
BUTYL ACETATE 123-86-4	20 - 25	150 ppm TWA; 710 mg/m3 TWA		
METHYL N-AMYL KETONE 110-43-0	1 - 5	100 ppm TWA; 465 mg/m3 TWA		
Trade Secret : PROPRIETARY PIGMENT	1 - 5	15 mg/m3 TWA (total dust)		
METHYL PROPYLKETONE 107-87-9	1 - 5	200 ppm TWA; 700 mg/m3 TWA		
Trade Secret : PROPRIETARY INERT	1 - 5	2 MG/M3		
TERT-BUTYL ACETATE 540-88-5	1 - 5	200 ppm TWA; 950 mg/m3 TWA		
CARBON BLACK 1333-86-4	.1 - 1	3.5 mg/m3 TWA		

ACGIH Threshold Limit Value (TLV's)

Common Name CAS #	Approx Wt%	TWA	STEL	Ceiling limits	Skin designations
BUTYL ACETATE 123-86-4	20 - 25	150 ppm TWA	200 ppm STEL		
DIMETHYL KETONE 67-64-1	10 - 15	750 PPM			
METHYL N-AMYL KETONE 110-43-0	1 - 5	50 ppm TWA			
Trade Secret : PROPRIETARY PIGMENT	1 - 5	10 mg/m3 TWA			
METHYL PROPYLKETONE 107-87-9	1 - 5	200 ppm TWA	250 ppm STEL		
Trade Secret : PROPRIETARY INERT	1 - 5	10 MG/M3			
TERT-BUTYL ACETATE 540-88-5	1 - 5	200 ppm TWA			
CARBON BLACK 1333-86-4	.1 - 1	3.5 mg/m3 TWA			

If this section is blank, no information is available.

9. PHYSICAL PROPERTIES

Odor:	Normal for this product type.
Physical State:	Liquid
pH:	Not determined.
Vapor pressure:	182 mmHG @ 122° F (50° C)
Vapor density (air = 1.0):	4
Boiling point:	133° F (56° C)
Solubility in water:	Slighly Soluble
Coefficient of water/oil distribution:	Not determined.
Density (weight per gallon):	9.34
Specific gravity (water = 1):	1.12
Evaporation rate (butyl acetate = 1.0):	5.6

10. STABILITY AND REACTIVITY

Stability:	This product is stable.
Conditions to Avoid:	None known.
Incompatibility:	Strong oxidizers.
Hazardous Polymerization:	None anticipated.
Hazardous Decomposition Products:	Carbon monoxide and carbon dioxide. Oxides of sulfur. Metal oxide fumes.
Sensitivity to static discharge:	Subject to static discharge hazards. Please see bonding and grounding information in Section 7.

11. TOXICOLOGICAL INFORMATION

Teratogens:
Contains ingredients which have shown evidence of reproductive effect.

Common Name CAS #	Approx Wt%	IARC Group 1 - Human Evidence	IARC Group 2A - limited human data	IARC Group 2b - sufficient animal data
CARBON BLACK 1333-86-4	.1 - 1			Monograph 65, 1996

Common Name CAS #	Approx Wt%	NTP Known carcinogens	NTP Suspect carcinogens	NTP Evidence of carcinogenicity
Trade Secret : PROPRIETARY INERT	1 - 5			YES

Common Name CAS #	Approx Wt%	OSHA Select carcinogens	OSHA Possible select carcinogens	ACGIH Carcinogens
CARBON BLACK 1333-86-4	.1 - 1		Monograph 65, 1996 IARC - Group 2B (Possibly carcinogenic to humans)	A4 - Not Classifiable as a Human Carcinogen

If this section is blank, no information is available.

12. ECOLOGICAL DATA

Not available at this time.

13. DISPOSAL CONSIDERATIONS

Disposal should be made in accordance with federal, state and local regulations.

14. TRANSPORTATION INFORMATION

U.S. Department of Transportation

Proper Shipping Name:	PAINT
Hazard Class:	3
UN ID Number:	UN1263
Packing Group:	II

49 CFR Hazardous Material Regulations Parts 100-180

The supplier will apply the combustible liquid exception in 49 CFR 173.150(f), limited quantity exceptions and consumer commodity rules, when authorized. Please check 49 CFR Parts 100-180 to determine if the use of these exceptions applies to your shipments when re-shipping our products.

International Air Transport Association:

Proper Shipping Name:	PAINT
Hazard Class:	3
UN ID Number:	UN1263
Packing Group:	II

International Maritime Organization:

Proper Shipping Name:	PAINT
Hazard Class:	3
UN ID Number:	UN1263
Packing Group:	II

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

Common Name CAS #	Approx Wt%	SARA 302	SARA 313	CERCLA RQ IN LBS.
BUTYL ACETATE 123-86-4	20 - 25			5000
TERT-BUTYL ACETATE 540-88-5	1 - 5			5000

SARA 311/312 Hazard Class:

Acute:	Yes
Chronic:	Yes
Flammability:	Yes
Reactivity:	No
Sudden Pressure:	No

U.S. STATE REGULATIONS:

Pennsylvania Right To Know:

PROPRIETARY PIGMENT	Trade Secret
BUTYL ACETATE	123-86-4
TERT-BUTYL ACETATE	540-88-5
METHYL N-AMYL KETONE	110-43-0
METHYL PROPYLKETONE	107-87-9
DIMETHYL KETONE	67-64-1

Additional Non-Hazardous Materials

PROPRIETARY ADDITIVE	Trade Secret
PROPRIETARY RESIN	Trade Secret
PROPRIETARY RESIN	Trade Secret
PROPRIETARY INERT	Trade Secret

Rule 66 status of product Not photochemically reactive.

INTERNATIONAL REGULATIONS - Chemical Inventories

TSCA Inventory: This product does not comply with TSCA Inventory Requirements.

Canada Domestic Substances List: Not all components in this product are listed on the Domestic Substances List.

16. OTHER INFORMATION

HMIS Codes

Health:	3
Flammability:	3
Reactivity:	1
PPE:	X - See Section 8 for Personal Protective Equipment (PPE).

Abbreviations:
OSHA - Occupational Safety and Health Administration, IARC - International Agency for Research on Cancer, NIOSH - National Institute of Occupational Safety and Health, NTP - National Toxicology Program, ACGIH - American Conference of Governmental Industrial Hygienists, SCAQMD - South Coast Air Quality Management District, TSCA - Toxic Substance Chemical Administration, IATA - International Air Transport Association, IMO - International Maritime Organization, DOT - Department of Transportation, NA - Not applicable, NOT ESTAB - Not established, N.A.V. - Not available, RQ - Reportable quantity, WT - Weight, MG/CU M - Milligrams per cubic meter, G/L - Grams per liter, MM - Millimeters, MPPCF - Millions of particles per cubic foot, PPM - parts per million, PPT - parts per thousand, TCC/PM - Tag closed cup / Pensky-Martens, PB - Lead, PEL - Permissible exposure level, TWA - Time Weighted Average, STEL - Short term exposure limit, C - Celsius, F - Fahrenheit.

Disclaimer:
The data on this sheet represent typical values. Since application variables are a major factor in product performance, this information should serve only as a general guide. Valspar assumes no obligation or liability for use of this information. UNLESS VALSPAR AGREES OTHERWISE IN WRITING, VALSPAR MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR FREEDOM FROM PATENT INFRINGEMENT. VALSPAR WILL NOT BE

LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. Your only remedy for any defect in this product is the replacement of the defective product, or a refund of its purchase price, at our option. This MSDS contains additional information required by the state of Pennsylvania.