## LABORATORY ANALYSIS



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US

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**COPELAND (MHDS)** 

T: F:

**REYLAM - DIECAST** Department

**PROTECH07 IHS ANNEAL QUENCH (X0071)** Equipment No.

System **Unknown Component** 

ENGINEERED LUBRICANTS ENCOOL SOL-6465GF-ND-XL-RO (--- GAL) Oil Type

Sample Information

## Diagnosis

The coolant mineral/hardness level is becoming elevated and amine levels are low. We recommend this system be drained, cleaned and refilled with new ENCOOL SOL-6465GF-ND-XL-RO.All component wear rates are normal. There is no indication of any contamination in the sample. The condition of the sample is acceptable for the time in service.

Lab Number         New         2402-00423         2401-00444         2312-01086           Date of Sample         (Typical)         08 Feb 2024         10 Jan 2024         20 Dec 2023           Oil Added         UNK         UNK         UNK         UNK           Last Drain Date              Months on Sample         41.3         40.3         39.7           Last Filter Service              Sample Point              Sample Status         SEVERE         NORMAL         SEVERE           RATIO PER REFRACTOMETER           Refract. Reading         2.1         3.2         2.4           Refract. Reading         2.1         3.2         2.4           DIGITAL         DIGITAL         DIGITAL         DIGITAL           DIGITAL         DIGITAL         DIGITAL         12:1           PH (ASTM E-70)           PH         Scale 0-14         ■ 8.9         9.0         ■ 8.9           Ratio Rec'd         olivater         AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3) <th>Sample informa</th> <th>1011</th> <th></th> <th></th> <th></th> <th></th>	Sample informa	1011					
Oil Added         UNK         UNK         UNK           Last Drain Date             Months on Sample         41.3         40.3         39.7           Last Filter Service              Sample Point              Sample Status         SEVERE         NORMAL         SEVERE           RATIO PER REFRACTOMETER           Refract. Reading         2.1         3.2         2.4           Refract. Model         DIGITAL         DIGITAL         DIGITAL           Perfact. Ratio         DIWater         13:1         ■8:1         ■12:1           ph (ASTM E-70)           PH         Scale 0-14         ■8.9         ■9.0         ■8.9           RATIO PER REFRACTOMETER           PH         Scale 0-14         ■8.9         ■9.0         ■8.9           Refract. Ratio         DIGITAL         DIGITAL         DIGITAL         DIGITAL           PH         Scale 0-14         ■8.9         ■9.0         ■8.9         ■8.9           RATIO PER REFRACTOMETER         RATIO PER REFRACTOMETER <td c<="" th=""><th>Lab Number</th><th></th><th>New</th><th>2402-00423</th><th>2401-00444</th><th>2312-01086</th></td>	<th>Lab Number</th> <th></th> <th>New</th> <th>2402-00423</th> <th>2401-00444</th> <th>2312-01086</th>	Lab Number		New	2402-00423	2401-00444	2312-01086
Last Drain Date	Date of Sample		(Typical)	08 Feb 2024	10 Jan 2024	20 Dec 2023	
Months on Sample       41.3       40.3       39.7         Last Filter Service            Sample Point            Sample Status       SEVERE       NORMAL       SEVERE         RATIO PER REFRACTOMETER         Refract. Reading       2.1       3.2       2.4         Refract. Model       DIGITAL       DIGITAL       DIGITAL         PIGITAL       DIGITAL       DIGITAL       DIGITAL         PIGITAL       DIGITAL       DIGITAL       DIGITAL         PIGITAL       DIGITAL       DIGITAL       DIGITAL         PIGITAL       DIGITAL       DIGITAL       DIGITAL       DIGITAL         PIGITAL       DIGITAL       <	Oil Added			UNK	UNK	UNK	
Last Filter Service Sample Point Sample Status SEVERE NORMAL SEVERE  RATIO PER REFRACTOMETER  Refract. Reading 2.1 3.2 2.4 Refract. Model Pligital Digital Digital Digital Digital Perfact. Ratio oil.water DIGITAL DIGITAL DIGITAL DIGITAL DIGITAL DIGITAL DIGITAL DIGITAL DIGITAL PH (ASTM E-70) PH Scale 0-14 8.9 9.0 8.9 Ratio Rec'd oil.water AS REC'D AS REC'D AS REC'D  HARDNESS (mg/L CaCO3) Hardness (CaCO3) Mg/L TOTAL AMINE  Total Total Total Total Tertiary Mmolgram	Last Drain Date						
Sample Point   Sample Status   SEVERE   NORMAL   SEVERE	Months on Sample			41.3	40.3	39.7	
Sample Status         SEVERE         NORMAL         SEVERE           RATIO PER REFRACTOMETER           Refract. Reading         2.1         3.2         2.4           Refract. Model         DIGITAL         DIGITAL         DIGITAL           Refract. Ratio         oilwater         13:1         8:1         12:1           pH (ASTM E-70)           pH Scale 0-14         8.9         9.0         8.9           AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3)           Hardness (CaCO3)         mg/L         55.3         31.4         20.7           Grains         3.3         1.8         1.2           TOTAL AMINE           Total         mmoligram         △ 0.10         0.15         0.12           Tertiary         mmoligram         △ 0.07         0.11         △ 0.06           Primary         mmoligram         △ 0.07         0.01         △ 0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0-6         ④ 0         ④ 0         ④ 0 <td colsp<="" th=""><th></th><th></th><th></th><th></th><th></th><th></th></td>	<th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
RATIO PER REFRACTOMETER           Refract. Reading         2.1         3.2         2.4           Refract. Model         DIGITAL         DIGITAL         DIGITAL           Refract. Ratio         oilwaler         13:1         8:1         12:1           pH (ASTM E-70)           pH Scale 0·14         8.9         9.0         8.9           Ratio Rec`d         oilwaler         AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3)           Hardness (CaCO3)         mg/L         55.3         31.4         20.7           Grains         3.3         1.8         1.2           TOTAL AMINE           Total         mmoligram         ▲ 0.10         0.15         0.12           Tertiary         mmoligram         ▲ 0.07         0.11         ▲ 0.06           Primary         mmoligram         ● 0.07         0.01         0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0·6         0         0         0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class <th>·</th> <th></th> <th></th> <th></th> <th></th> <th></th>	·						
Refract. Reading         2.1         3.2         2.4           Refract. Model         DIGITAL         DIGITAL         DIGITAL           Prince of the principle of the pri	Sample Status			SEVERE	NORMAL	SEVERE	
Refract. Model         DIGITAL         DIGITAL         DIGITAL           Refract. Ratio         oilwater         ■ 13:1         ■ 8:1         ■ 12:1           pH (ASTM E-70)           pH         \$cale 0.14         ■ 8.9         ■ 9.0         ■ 8.9           Ratio Rec'd         oilwater         AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3)           Hardness (CaCO3)         mg/L         55.3         31.4         20.7           Grains         3.3         1.8         1.2           TOTAL AMINE           Total         mmoligam         ▲ 0.10         0.15         0.12           Tertiary         mmoligam         ▲ 0.07         0.11         ▲ 0.06           Primary         mmoligam         ● 0.07         0.01         0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0.6         ■ 0         ■ 0         ■ 0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class         Scale 0.3         ■ 0         ■ 0         ■ 0           ENERGY DISPERSIVE XR	RATIO PER RE	FRACT	OMETER				
Refract. Ratio   Oilwater   13:1   8:1   12:1     pH (ASTM E-70)     pH   Scale 0-14   8.9   9.0   8.9     Ratio Rec'd   Oiltwater   AS REC'D   AS REC'D   AS REC'D     HARDNESS (mg/L CaCO3)     Hardness (CaCO3)   mg/L   55.3   31.4   20.7     Grains   3.3   1.8   1.2     TOTAL AMINE     Total   mmolgram   0.10   0.15   0.12     Tertiary   mmolgram   0.07   0.11   0.06     Primary   mmolgram   0.03   0.04   0.06     BACTERIA COUNT (Class Range 0 to 6)     Bacteria Class   Scale 0-6   0   0   0   0     FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)     Yeast Class   Scale 0-3   0   0   0   0     Mold Class   Scale 0-3   0   0   0   0     ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)     ppm Chlorine (CI)   ppm   * * * * * * * * * * * * * * * * * *	Refract. Reading			2.1	3.2	2.4	
pH (ASTM E-70)         pH Ratio Rec'd oil:water       AS REC'D AS REC'D AS REC'D         HARDNESS (mg/L CaCO3)         Hardness (CaCO3) mg/L 55.3 31.4 20.7         Grains 3.3 1.8 1.2         TOTAL AMINE         Total mmolgram	Refract. Model			DIGITAL	DIGITAL	DIGITAL	
pH         Scale 0-14         ■8.9         9.0         ■8.9           Ratio Rec`d         oilwater         AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3)           Grains         3.3         31.4         20.7           Grains         3.3         1.8         1.2           TOTAL AMINE           Total         mmolgram         ▲ 0.10         □0.15         □0.12           Tertiary         mmolgram         ▲ 0.07         □0.11         ▲ 0.06           Primary         mmolgram         □0.03         □0.04         □0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0-6         □0         □0         □0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)         Yeast Class         Scale 0-3         □0         □0         □0           Mold Class         Scale 0-3         □0         □0         □0         □0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)           ppm Chlorine (Cl)         ppm         *         *         *	Refract. Ratio	oil:water		<b>13:1</b>	<b>■</b> 8:1	□12:1	
Ratio Rec`d         oil.water         AS REC'D         AS REC'D         AS REC'D           HARDNESS (mg/L CaCO3)           Hardness (CaCO3)         mg/L         55.3         31.4         20.7           Grains         3.3         1.8         1.2           TOTAL AMINE           Total         mmolgram         ▲ 0.10         □ 0.15         □ 0.12           Tertiary         mmolgram         ▲ 0.07         □ 0.11         ▲ 0.06           Primary         mmolgram         □ 0.03         □ 0.04         □ 0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0-6         □ 0         □ 0         □ 0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class         Scale 0-4         □ 0         □ 0         □ 0           Mold Class         Scale 0-3         □ 0         □ 0         □ 0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)           ppm Chlorine (Cl)         ppm         *         *         *	pH (ASTM E-70)	)					
Ratio Rec`d       oil:water       AS REC'D       AS REC'D       AS REC'D         HARDNESS (mg/L CaCO3)         Hardness (CaCO3)       mg/L       55.3       31.4       20.7         Grains       3.3       1.8       1.2         TOTAL AMINE         Total       mmolgram       ♠ 0.10       ⊕ 0.15       ⊕ 0.12         Tertiary       mmolgram       ♠ 0.07       ⊕ 0.11       ♠ 0.06         Primary       mmolgram       ⊕ 0.03       ⊕ 0.04       ⊕ 0.06         BACTERIA COUNT (Class Range 0 to 6)         Bacteria Class       Scale 0-6       ⊕ 0       ⊕ 0       ⊕ 0         FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)         Yeast Class       Scale 0-4       ⊕ 0       ⊕ 0       ⊕ 0         Mold Class       Scale 0-3       ⊕ 0       ⊕ 0       ⊕ 0         ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)         ppm Chlorine (Cl)       ppm       *       *       *	рН	Scale 0-14		<b>■8.9</b>	□9.0	□8.9	
HARDNESS (mg/L CaCO3)  Hardness (CaCO3) mg/L 55.3 31.4 20.7  Grains 3.3 1.8 1.2  TOTAL AMINE  Total mmol/gram	IT.						
Hardness (CaCO3) mg/L 55.3 31.4 20.7 Grains 3.3 1.8 1.2  TOTAL AMINE  Total mmoligram			.O3/			11011202	
Grains       3.3       1.8       1.2         TOTAL AMINE         Total       mmol/gram       ▲ 0.10       □ 0.15       □ 0.12         Tertiary       mmol/gram       ▲ 0.07       □ 0.11       ▲ 0.06         Primary       mmol/gram       □ 0.03       □ 0.04       □ 0.06         BACTERIA COUNT (Class Range 0 to 6)         Bacteria Class       Scale 0.6       □ 0       □ 0       □ 0         FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)         Yeast Class       Scale 0.4       □ 0       □ 0       □ 0         Mold Class       Scale 0.3       □ 0       □ 0       □ 0         ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)         ppm Chlorine (Cl)       ppm       *       *       *		_	,00)		0.1.1		
TOTAL AMINE  Total	, ,	mg/L					
Total         mmol/gram         ▲ 0.10         □ 0.15         □ 0.12           Tertiary         mmol/gram         ▲ 0.07         □ 0.11         ▲ 0.06           Primary         mmol/gram         □ 0.03         □ 0.04         □ 0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0-6         □ 0         □ 0         □ 0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class         Scale 0-4         □ 0         □ 0         □ 0           Mold Class         Scale 0-3         □ 0         □ 0         □ 0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)         ppm Chlorine (Cl)         ppm         *         *         *	Grains			3.3	1.8	1.2	
Tertiary         mmoligram         ▲ 0.07         □ 0.11         ▲ 0.06           Primary         mmoligram         ■ 0.03         □ 0.04         □ 0.06           BACTERIA COUNT (Class Range 0 to 6)           Bacteria Class         Scale 0-6         ■ 0         □ 0         □ 0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class         Scale 0-4         □ 0         □ 0         □ 0           Mold Class         Scale 0-3         □ 0         □ 0         □ 0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)           ppm Chlorine (Cl)         ppm         *         *         *	TOTAL AMINE						
Primary mmoligram 0.03 0.04 0.06  BACTERIA COUNT (Class Range 0 to 6)  Bacteria Class Scale 0.6 0 0 0 0  FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)  Yeast Class Scale 0.4 0 0 0 0  Mold Class Scale 0.3 0 0 0 0  ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)  ppm Chlorine (CI) ppm * * * * *	Total	mmol/gram		<b>▲</b> 0.10	□ 0.15	□0.12	
BACTERIA COUNT (Class Range 0 to 6)  Bacteria Class Scale 0-6	Tertiary	mmol/gram		▲ 0.07	0.11	▲ 0.06	
Bacteria Class         Scale 0-6         0         0         0           FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)           Yeast Class         Scale 0-4         0         0         0           Mold Class         Scale 0-3         0         0         0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)           ppm Chlorine (Cl)         ppm         *         *         *	Primary	mmol/gram		■ 0.03	□0.04	□0.06	
FUNGUS COUNT (Class Ranges: Yeast 0 to 4/Mold 0 to 3)  Yeast Class Scale 0.4	BACTERIA COL	JNT (Cl	ass Range 0	to 6)			
Yeast Class         Scale 0.4         0         0         0           Mold Class         Scale 0.3         0         0         0           ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)         ppm Chlorine (Cl)         ppm         *         *         *	Bacteria Class	Scale 0-6		<b>□</b> 0	<b>0</b>	□0	
Mold Class  Scale 0-3  ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)  ppm Chlorine (CI)  ppm   *   *	FUNGUS COUN	IT (Clas	s Ranges: Y	east 0 to 4/Mol	d 0 to 3)		
ENERGY DISPERSIVE XRF (*BELOW MINIMUM DETECTION LIMIT)  ppm Chlorine (Cl) ppm * * *	Yeast Class	Scale 0-4		<b>■</b> 0	□0	□0	
ppm Chlorine (Cl) ppm * * *	Mold Class	Scale 0-3		<b>■</b> 0	0	0	
ppin Gnorne (G) ppin	ENERGY DISPE	RSIVE	XRF (*BELC	DW MINIMUM E	ETECTION LIMI	T)	
Contamination	ppm Chlorine (Cl)	ppm		*	*	*	
	Contamination						
Water NEG NEG NEG	Water			NEG	NEG	NEG	

Customer Id: MOTMCA **Sample No.:** EN24020423 Lab Number: 24020423 Test Package: TEST



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## **FUEL REPORT**