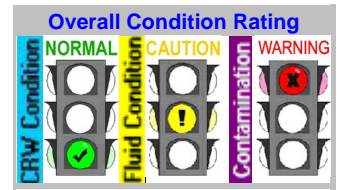


C Code : **30017003**
 U Name :
 T
 O Address : c/o
 M 12/1 Moo 2, Bangmod,
 E Tungkru, Bangkok 10140
 R
 Site :
 Location :
 Test code : HT818

Unit ID : **HOT OIL BOILER**
 Unit Type : Heat Transfer Oil
 Unit Make : (not given)
 Unit Model : (not given)
 Oil type / Viscosity : SHELL FM HEAT TRANSFER 32
 Oil System Capacity : 40000 Liters



Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)

Note Flash point (Close cup, D3828) is slightly lower than normal limits.
 TAN appear in normal working range.
 Insolubles matter in oil is considered high level range. High insoluble matter in oil is probably related to the heat transfer properties and efficient transfer of heat.
 Recommend top up oil by Bleed and Feed method that is drain some oil and top it off to reduce the contamination.
 Recommend resample in 3 months from the time this sample was taken, to monitor.

Wasan C / Andy Sitton

			Current Sample		Previous Sample		Baseline and Alarm Limit				
Condition History			Wear	Oil	Cont.	Alarm Limit					
			N	C	W	Alarm Limit Matrix - Set Name (Equipment type / oil type) Heat Transfer General Shell FM Heat Transfer 32					
Lab ID	Test Method	Result		153750		B A S E L I N E					
Bottle ID			923716								
Date Sampled			04-Feb-11								
Oil Hours (Kms)			Not Given								
Unit Hours (Kms)			Not Given								
Oil Added (Liters)											
Filters Hours (Kms)											
Corrosion, Rust and/or Wear Condition (CRW Condition)							Oil Specification (SO)	RDE fine		RFS coarse	
Wear Element	Method	Unit	RDE fine	RFS coarse			U-Caution	U-Warning	U-Caution	U-Warning	
Iron	D-6595	PPM	13.4			>50	>100	>50	>100		
Chromium	D-6595	PPM	0.0			>20	>40	>20	>40		
Lead	D-6595	PPM	0.0			>30	>60	>30	>60		
Copper	D-6595	PPM	0.0			>40	>75	>40	>75		
Tin	D-6595	PPM	0.0			>10	>40	>10	>40		
Aluminum	D-6595	PPM	0.0			>20	>40	>20	>40		
Nickel	D-6595	PPM	0.0								
Silver	D-6595	PPM	0.0								
Molybdenum	D-6595	PPM	0.0								
Titanium	D-6595	PPM	0.0								
Fluid Condition and Safety in Use							OS	L-Warning	L-Caution	U-Caution	U-Warning
Viscosity @ 40°C	D-445	cSt	31.2			32.0	<28.8	<30.4	>33.6	>35.2	
Viscosity @ 100°C	D-445	cSt									
Oxidation	FTIR	Abs	4.3						>1	>2	
Nitration	FTIR	Abs	3.6								
TAN	D-974	mg KOH/g	0.10								
Safety in Use							OS	L-Warning	L-Caution		
Flash Point, closed cup	D-3828	°C	146	C		222	<120	<150			
Flash Point, open cup	D-92	°C	210				<140	<170			
Fire Point, open cup	D-92	°C	230				<160	<190			
Contamination							OS		U-Caution	U-Warning	
Water	T-H2O Check™	%(Wt.)	0.010					>0.03	>0.05		
Sodium	D-6595	PPM	0								
Silicon	D-6595	PPM	0.5				>10	>20	>10	>20	
Additional Test							OS	L-Warning	L-Caution	U-Caution	U-Warning

Note: Alarm Limits are variable and dependent upon dataset size and to be used as general guideline.

No Sign or **N** : NORMAL , C or **C** : CAUTION (first level warning limit) , W or **W** : Warning (second level warning limit)

U-Caution : Upper CAUTION Level L-Caution : Lower CAUTION Level

U-Warning : Upper WARNING Level L-Warning : Lower WARNING required Level

Baseline will be data of either "The new oil" or "Reference oil" or "Oil specification".

Accuracy of interpretation and recommendation are based on representatives sample and information supplied.

First Level Alarm: Alert Limit in Upper Level and/or Lower Level

Second Level Alarm: Alert Limit in Upper Level and/or Lower Level

TNO = The new oil , RO = Reference oil , OS = Oil Specification



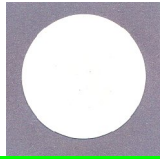
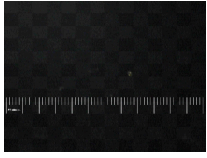
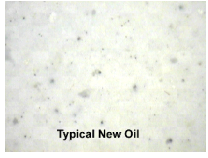
No warranty is expressed or implied for this report.

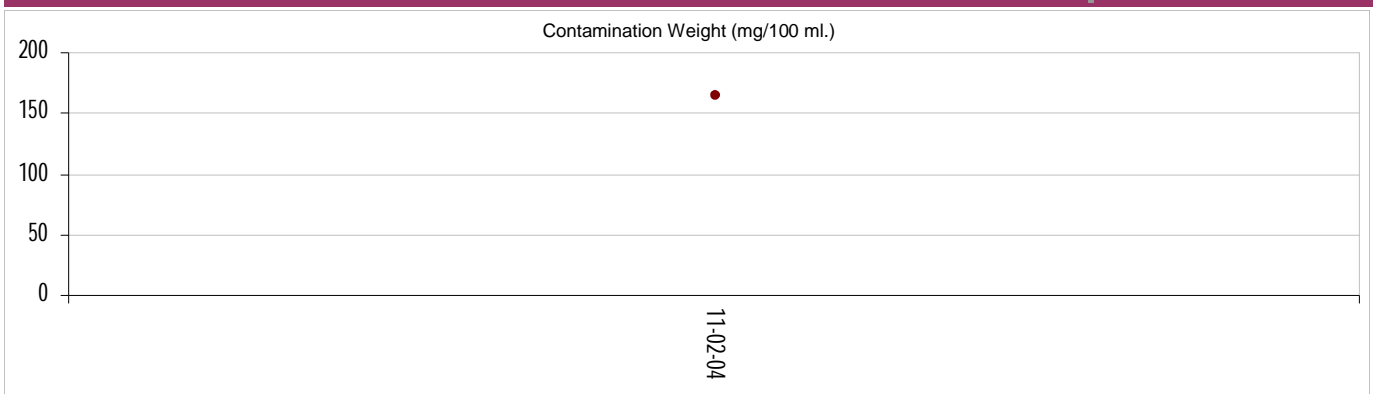
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Unit ID : **HOT OIL BOILER**
 Unit Type : Heat Transfer Oil
 Unit Make : (not given)
 Unit Model : (not given)
 Oil type / Viscosity : SHELL FM HEAT TRANSFER 32
 Oil System Capacity : 40000 Liters

Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)

Gravimetric analysis (photos shown) indicate the oil is highly contaminated with sludge, dirt, rust, coking and other debris.

	Current Sample		Previous Sample								
Lab ID	153750										
Bottle ID	923716										
Date Sampled	04-Feb-11										
Oil Hours (Kms)	Not Given										
Unit Hours (Kms)	Not Given										
Oil Added (Liters)											
Filters Hours (Kms)											
Contamination											
Gravimetric Analysis : Test Method for Insoluble Contamination of Fluid					The New Oil (TNO)						
Fluid Volume	10	ml	ml	ml	10 ml						
Filter Type	0.8	micron	micron	micron	0.80 micron						
Photo of Insoluble Contamination Retained on Filter Membrane Disc											
Photo of Insoluble Contamination Retained on Filter Membrane Disc											
Photo of Insoluble Contamination Retained on Filter Membrane Disc - Magnification 100x											
Photo of Insoluble Contamination Retained on Filter Membrane Disc Magnification 100x											
Contaminant Retain on Filter Disk	% Visual Rating		% Visual Rating		% Visual Rating						
Grey & Black Metal	10										
Copper Base Metal											
Bright & White Metal											
Rust & Corrosion											
Dirt & Dust	10				100						
Fibers / Filters / Seals											
Sludge & Varnish											
Coking	80										
Contamination Weight (mg/100 ml)	165.2	mg/100 ml W	mg/100 ml	mg/100 ml	<table border="1"> <tr> <td>TNO</td> <td>Caution</td> <td>Warning</td> </tr> <tr> <td>2</td> <td>>50</td> <td>>80</td> </tr> </table>	TNO	Caution	Warning	2	>50	>80
TNO	Caution	Warning									
2	>50	>80									



Gravimetric Analysis:
 - determines total solid and soft compound contamination level by weight
 - determines oil contamination level by colorimetric (color density)
 - identifies particle contamination in oils by microscopic analysis
 In brief , will analyze oil cleanliness and source(s) of contamination.

C Code : **30017003**
U Name :
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R
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Unit ID : **HOT OIL BOILER**
Unit Type : Heat Transfer Oil
Unit Make : (not given)
Unit Model : (not given)
Oil type / Viscosity : SHELL FM HEAT TRANSFER 32
Oil System Capacity : 40000 Liters

Lab ID : 153750 Date sampled : 04-Feb-11 Hours on Oil : Not Given Hours on Unit : Not Given Bottle ID : 923716

ส่วนที่ 1 : หน้าหลัก[Section 1 : Main Page](#)

ค่าจุดวาบไฟ(วิเคราะห์แบบระบบปิด, D3828) ต่ำกว่าค่าเดือนภัยเล็กน้อย
สภาพความเป็นกรดของน้ำมัน ยังอยู่ในช่วงปกติ
ผลการวิเคราะห์ปริมาณสิ่งสกปรกที่แขวนลอยอยู่ในน้ำมันพบว่าค่าสูง ซึ่งอาจส่งผลกระทบต่อประสิทธิภาพการถ่ายเทความร้อน
แนะนำถ่ายน้ำมันออกบางส่วนและเติมเพิ่มบางส่วนเพื่อลดปริมาณการปนเปื้อนสิ่งสกปรกให้น้อยลง
แนะนำให้เก็บตัวอย่างซ้ำอีกครั้งภายใน 3 เดือน หลังจากเก็บตัวอย่างครั้งนี้ เพื่อเฝ้าติดตาม

ส่วนที่ 2 : หน้าที่สอง[Section 2 : Second Page](#)**ส่วนที่ 3 : หน้าของ Analytical Ferrography**[Section 3 : Analytical Ferrography Page](#)**ส่วนที่ 4 : หน้าของ Gravimetric Page**[Section 4 : Gravimetric Page](#)

ผลวิเคราะห์จากการกรองผ่านกระดาษกรอง (แสดงดังภาพ) พบว่าน้ำมันมีการปนเปื้อนปริมาณสูงของตะกอน ฝุ่นละออง เศษโลหะกัดกร่อน ถ้ำคาร์บอน และเศษ
สิ่งสกปรกอื่นๆ