CUSTOMER

Code : **30017003**

Name :

Address : c/o
12/1 Moo 2, Bangmod,
Tungkru, Bangkok 10140

Site :

Location :

Test code : HT818

EQUIPMENT

Unit ID : **HOT OIL BOILER**

Unit Type : Heat Transfer Oil

Unit Make : (not given)

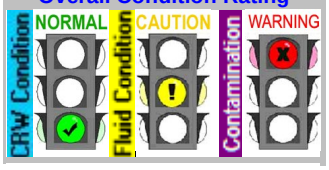
Unit Model : (not given)

OIL

Oil type / Viscosity : SHELL FM HEAT TRANSFER 32

Oil System Capacity : 40000 Liters

Overall Condition Rating



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 insuluble 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

Condition History	Test Method	Result	Current Sample	Previous Sample	Baseline and Alarm Limit
			Wear: N / Oil: C / Cont.: W		BASELINE — Alarm Limit: Alarm Limit Matrix -Set Name (Equipment type / oil type): Heat Transfer General Shell FM Heat Transfer 32
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)					

Corrosion, Rust and/or Wear Condition (CRW Condition)					Oil Specification (SO)	RDE fine U-Caution	RDE fine U-Warning	RFS coarse U-Caution	RFS coarse U-Warning
Wear Element	**Method**	**Unit**	**RDE fine**	**RFS coarse**					
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						
Nitration	FTIR	Abs	3.6						
TAN	D-974	mg KOH/g.	0.10					>1	>2
Safety in Use					OS	L-Warning	L-Caution		
Flash Point, closed cup	D-3828	°C	146	C		<120	<150		
Flash Point, open cup	D-92	°C	210		222	<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
						RDE fine U-Caution	RDE fine U-Warning	RFS coarse U-Caution	RFS coarse U-Warning
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
First Level Alarm ..Alert Limit in Upper Level and/or Lower Level
Second Level Alarm Alert Limit in Upper Level and/or Lower Level
Baseline will be data of either "The new oil" or "Reference oil" or "Oil specification".
TNO = The new oil , RO = Reference oil , OS = Oil Specification
Accuracy of interpretation and recommendation are based on representatives sample and information supplied.
No warranty is expressed or implied for this report.

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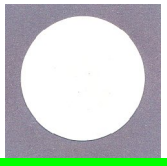
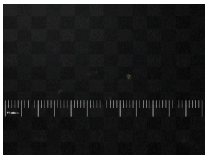
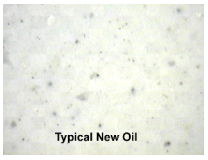
CUSTOMER
Code : **30017003**
Name :
Address : c/o 12/1 Moo 2, Bangmod, Tungkru, Bangkok 10140
Site :
Location :
Test code : HT818

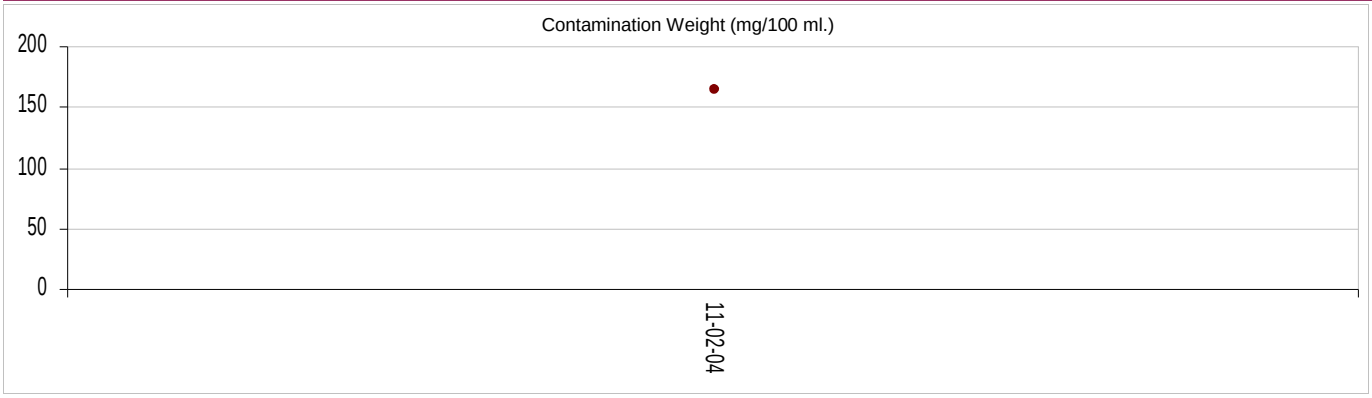
EQUIPMENT
Unit ID : **HOT OIL BOILER**
Unit Type : Heat Transfer Oil
Unit Make : (not given)
Unit Model : (not given)

OIL
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		Gravimetric Analysis (Mod. ASTM D-4898)	
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	% 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	TNO 2	Caution >50 / Warning >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.

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CUSTOMER
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Address : c/o 12/1 Moo 2, Bangmod, Tungkru, Bangkok 10140
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Location :
Test code : HT818

EQUIPMENT
Unit ID : **HOT OIL BOILER**
Unit Type : Heat Transfer Oil
Unit Make : (not given)
Unit Model : (not given)

OIL
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) ต่ำกว่าค่าเตือนภัยเล็กน้อย
สภาพความเป็นกรดของน้ำมัน ยังอยู่ในช่วงปกติ
ผลการวิเคราะห์ปริมาณสิ่งสกปรกที่แขวนลอยอยู่ในน้ำมันพบว่ามีค่าสูง ซึ่งอาจส่งผลต่อประสิทธิภาพการถ่ายเทความร้อน
แนะนำถ่ายน้ำมันออกบางส่วนและเติมเพิ่มบางส่วนเพื่อลดปริมาณการปนเปื้อนสิ่งสกปรกให้น้อยลง
แนะนำเก็บตัวอย่างซ้ำอีกครั้งภายใน 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 เถ้าคาร์บอน และเศษสิ่งสกปรกอื่นๆ