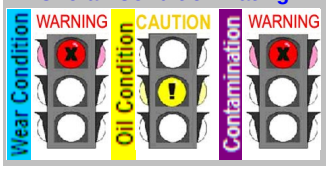
CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2
T.Bangchang, A.Bangchang
Rayong 21130
Site :
Location :
Test code : 884

EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

Overall Condition Rating



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

Sediment particles found in bottom of sample bottle.
Note the significant increase in ferrous particles since the last sampling. This is cause for concern.
Heavy amount of dirt and abrasive wear noted.
Recommend check for other abnormal operating parameters, i.e., vibration, noise, heat etc. If abnormal condition exists, please inform laboratory with next sample.
Recommend change oil and flush system with clean oil to remove contamination, if the oil from this sample is still in use in this component.

Wasan C / Andy Sitton

Condition History	Test Method	Result	Current Sample Wear	Current Sample Oil	Current Sample Cont.	Previous Sample Wear	Previous Sample Oil	Previous Sample Cont.	Wear	Oil	Cont.
			W	C	W	N	N	N	W	W	W
Lab ID			149610			146401			145491		
Bottle ID			924563			924288			915508		
Date Sampled			05-Dec-10			18-Oct-10			30-Sep-10		
Oil Hours (Kms)			1272			552			192		
Unit Hours (Kms)			1272			552			192		
Oil Added (Liters)											
Filters Hours (Kms)											
Wear Condition											
Wear Element	**Method**	**Unit**	**RDE fine**	**RFS coarse**		**RDE fine**	**RFS coarse**		**RDE fine**	**RFS coarse**	
Iron	D-6595	PPM	8.8 C	2444.3 W		0.0	10.9		18.9 W	2220.4 W	
Chromium	D-6595	PPM	0.0	9.6 W		0.2	0.0		0.1	4.8 W	
Lead	D-6595	PPM	0.0	4.6		0.7	1.9		0.4	7.4 C	
Copper	D-6595	PPM	0.0	20.6 C		0.1	0.2		0.2	3.7	
Tin	D-6595	PPM	0.0	0.0		1.3	0.0		0.4	0.0	
Aluminum	D-6595	PPM	0.0	136.2 W		0.5	1.4		5.3 W	208.9 W	
Nickel	D-6595	PPM	0.0	1.2 C		0.0	0.0		0.0	0.2	
Silver	D-6595	PPM	0.0	0.0		0.0	0.0		0.0	0.0	
Molybdenum	D-6595	PPM	0.0	0.8		0.0	0.6		0.0	3.5	
Titanium	D-6595	PPM	0.0	0.0		0.0	0.0		0.0	9.2	
Oil Condition											
Viscosity @ 40 °C	D-445	cSt	216.8			217.0			218.7		
Viscosity @ 100 °C	D-445	cSt									
Oxidation	FTIR	Abs	3.4			3.0			3.2		
Nitration	FTIR	Abs	2.5			2.0			2.7		
TAN	D-974	mg KOH/g.	0.27			0.26			0.33		
TBN	D-4739	mg KOH/g.									
Contamination											
Water	T-H2O Check™	% (Wt.)	0.031 C			0.019			0.021		
Sodium	D-6595	PPM	1			0			3		
Silicon	D-6595	PPM	2.3	277.7 W		1.7	3.8		11.3 W	373.6 W	
Additive Element											
Boron	D-6595	PPM	0			0			0		
Magnesium	D-6595	PPM	1			0			5		
Calcium	D-6595	PPM	7			1			21		
Barium	D-6595	PPM	0			0			0		
Phosphorus	D-6595	PPM	316			271			333		
Zinc	D-6595	PPM	7	771		2	47		6	243	
Additional Test											
Flash Point	D-3828	°C									
Viscosity Index	D-2270										

Baseline and Alarm Limit

BASELINE

Alarm Limit

Alarm Limit Matrix -Set Name (Equipment type / oil type)

Gearbox Nord SH Cassida GL220(Purac,March 19,2010)

The New Oil (TNO)	RDE fine U-Caution	RDE fine U-Warning	RFS coarse U-Caution	RFS coarse U-Warning
0	>6	>10	>80	>120
0	>1	>2	>2	>4
0	>2	>3	>5	>8
0	>1.5	>2.5	>14	>24
0	>2	>4	>1	>2
0	>1	>2	>10	>20
0	>1	>2	>1	>2
0				
0				
0				

TNO	L-Warning	L-Caution	U-Caution	U-Warning
218.2	<196.4	<207.3	>229.1	>240
3.3			>4.1	>4.9
2.4			>3	>3.6
0.45			>0.95	>1.45

TNO			U-Caution	U-Warning
0.010			>0.03	>0.05

	RDE fine U-Caution	RDE fine U-Warning	RFS coarse U-Caution	RFS coarse U-Warning
0				
0	>3	>6	>10	>20

TNO
0
0
0
0
390
1

TNO	U-Caution	U-Warning	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.

Focuslab Ltd 2/39 Thosapol Land 4 Bldg., Bangna-Trad Rd KM-3 Bangkok 10260 Thailand
Website : http://www.focuslab.co.th
Tel : +66 2 361 8600 Fax : + 66 2 3618567
Email : focuslab@focuslab.co.th

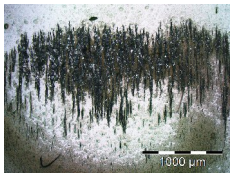
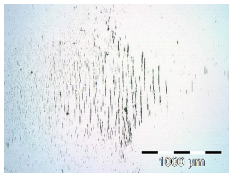
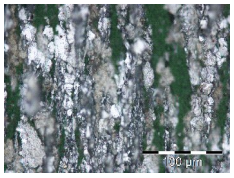
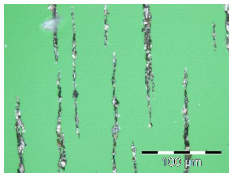
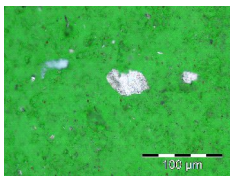
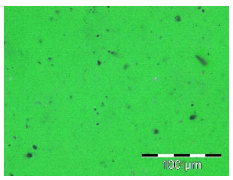
CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2
T.Bangchang, A.Bangchang
Rayong 21130
Site :
Location :
Test code : 884

EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

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

Fatigue wear appears to be one of the major abnormal wear mode in progress.
Fatigue particles found in the ferrogram may be an indication of the dirt related fatigue wear.
Note the presence of white-metal particles, which may indicate wear from journal bearings, plane bearings or other white-metal type of bushing.
Black oxides in ferrogram can indicate insufficient lubrication. Associated with insufficient lubrication between metal surface.

	Current Sample	Previous Sample		Typical Normal Ferrography
Lab ID	149610	146401	145491	
Bottle ID	924563	924288	915508	
Date Sampled	05-Dec-10	18-Oct-10	30-Sep-10	
Oil Hours (Kms)	1272	552	192	
Unit Hours (Kms)	1272	552	192	
Oil Added (Liters)				
Filters Hours (Kms)				
Wear Condition				
Ferrographic Analysis				
Volume of Sample Used	3.00 ml	ml	ml	3.00 ml
Image of Wear & Contaminants (Ferrogram) Magnification 50X				
Image of Wear & Contaminants (Ferrogram) Magnification 500X				
Image of Wear & Contaminants (Filtergram) Magnification 500X				

Wear & Contaminants Particles	%Rating	Size (Micron)	Particle Type	%Rating	Size (Micron)	Particle Type	%Rating	Size (Micron)	Particle Type	%Rating	Size (Micron)	Particle Type
Normal Rubbing Wear	30	2-3	F							95	2-3	F
Fatigue Wear	20	20-80	F									
Fatigue Sphere												
Severe Sliding Wear												
Cutting Wear												
Black Oxides	20	20-80	F									
Red Oxides												
Corrosive Wear												
Dirt and Dust	20	10-100	C							5	5-10	C
White metal	10	20-50	N									
Ferrographic Analysis Rating (FAR) rating in grade		F										

%Rating : Percent area covered by wear debris particles or contaminant particles.
Size : Size in micron unit (0.001 mm)
F : Ferrous wear particles
N : Non-ferrous wear particles
C : Contaminant particles

Ferrographic Analysis Rating (FAR) , rating in grade
A : Excellent - normal rubbing wear condition
B : Good - normal rubbing wear condition
C : Fair or moderate - normal rubbing wear condition
D : Severe and/or critical - wear condition
F : Extreme severe and/or extreme critical - wear condition

CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2
T.Bangchang, A.Bangchang
Rayong 21130
Site :
Location :
Test code : 884

EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

Lab ID : 149610 **Date sampled :** 05-Dec-10 **Hours on Oil :** 1272 **Hours on Unit :** 1272 **Bottle ID :** 924563

ส่วนที่ 1 : หน้าหลัก — Section 1 : Main Page

พบเศษตะกอนที่กันขวดตัวอย่าง
พบการเพิ่มขึ้นของอนุภาคโลหะ ตั้งแต่การสุ่มเก็บตัวอย่างครั้งที่แล้ว
สังเกต-ปริมาณมากของฝุ่นละออง และอนุภาคโลหะสึกหรอแบบขูดขีด (abrasive wear)
แนะนำให้ตรวจสอบถึงความผิดปกติของปัจจัยการทำงานอื่นๆ อาทิ การสั่นสะเทือน เสียง ความร้อน ฯลฯ ถ้าหากยังมีสภาพผิดปกติอยู่ แจ้งให้ห้องแลบพร้อมกับเก็บและส่งตัวอย่างครั้งต่อไป
แนะนำให้ถ่ายน้ำมันและล้างระบบด้วยน้ำมันใหม่เพื่อขจัดสิ่งปนเปื้อน ถ้าน้ำมันหล่อลื่นนี้ยังคงใช้งานในขณะนี้

ส่วนที่ 2 : หน้าที่สอง — Section 2 : Second Page

ส่วนที่ 3 : หน้าของ Analytical Ferrography — Section 3 : Analytical Ferrography Page

พบอนุภาคการสึกหรอแบบล้าตัว ซึ่งเป็นการสึกหรออย่างผิดปกติที่รุนแรงตัวหนึ่ง
อนุภาคการสึกหรอแบบล้าตัวที่พบ อาจเกี่ยวเนื่องมาจากอนุภาคสิ่งสกปรกในระบบ
ตรวจพบอนุภาคเศษโลหะนอกกลุ่มเหล็ก เศษโลหะสึกหรอที่พบชี้ว่าเป็นไปได้ที่มีการสึกหรอผิดปกติของแบริ่ง
โลหะสีดำบนสไลด์เฟอร์โรแกรม อาจชี้ว่ามีการหล่อลื่นไม่สมบูรณ์หรือขาดสารหล่อลื่นระหว่างผิวสัมผัส

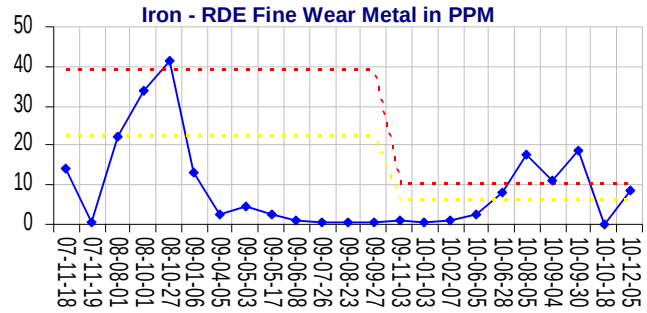
ส่วนที่ 4 : หน้าของ Gravimetric Page — Section 4 : Gravimetric Page

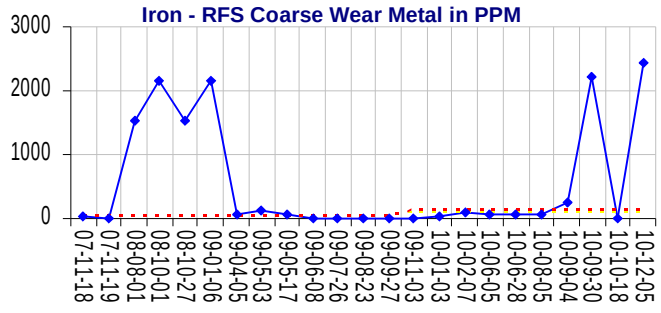
CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2 T.Bangchang, A.Bangchang Rayong 21130
Site :
Location :
Test code : 884

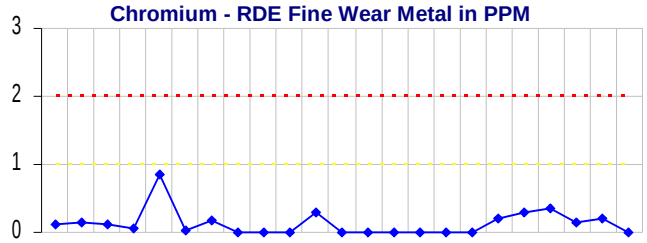
EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

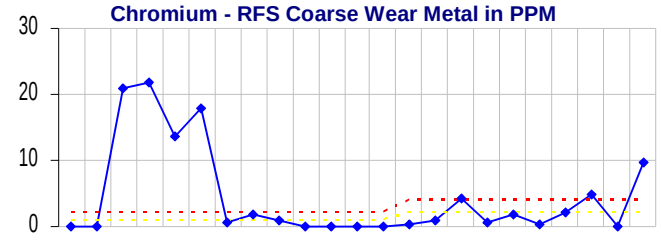
OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

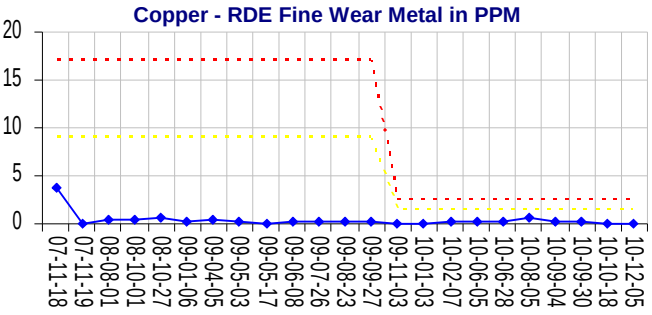
Wear Condition

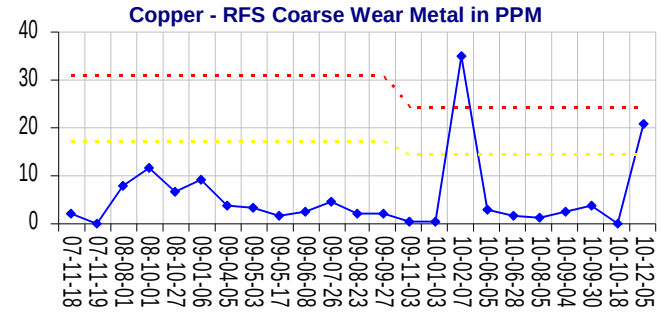


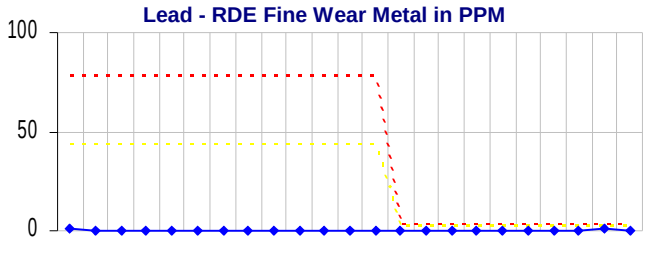


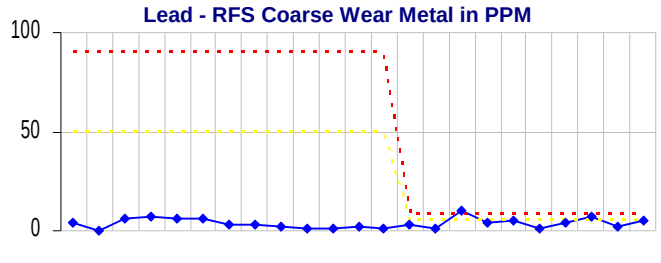


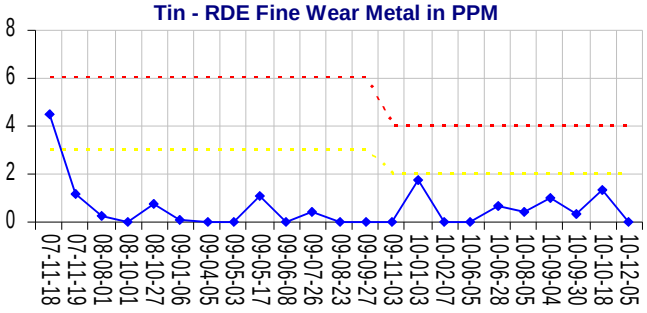


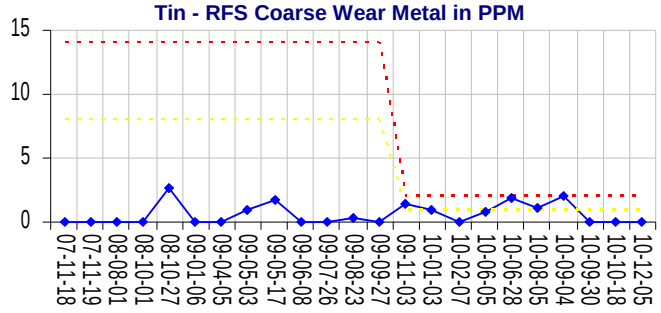










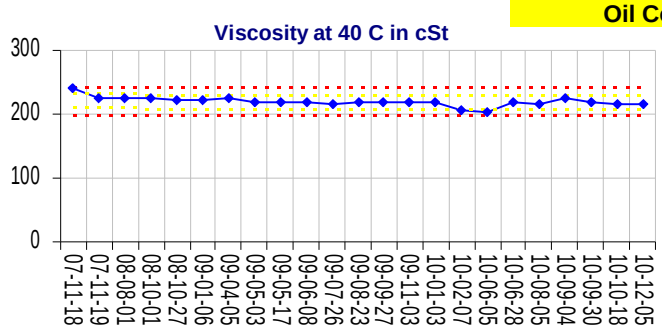


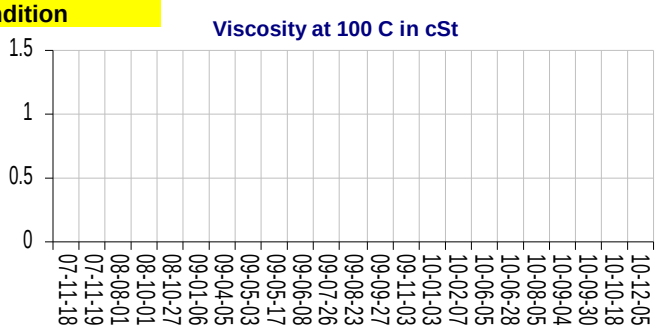
CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2
T.Bangchang, A.Bangchang
Rayong 21130
Site :
Location :
Test code : 884

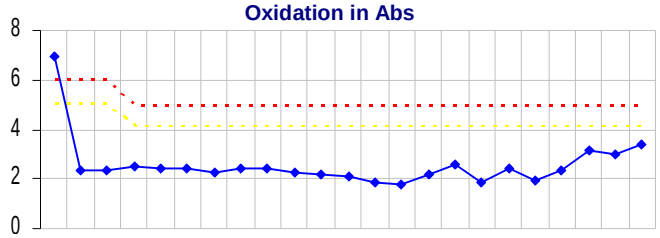
EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

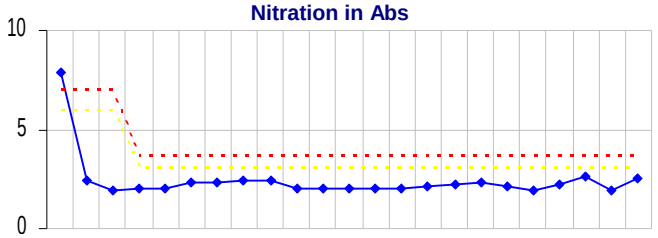
OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

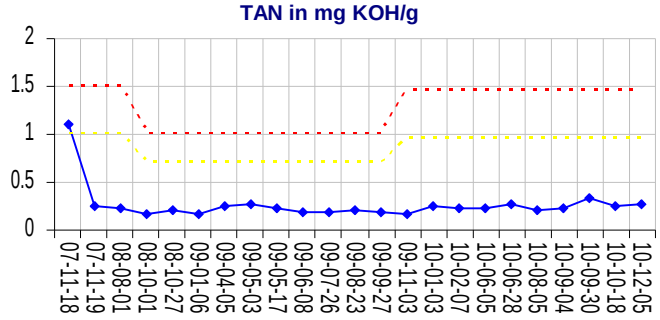
Oil Condition

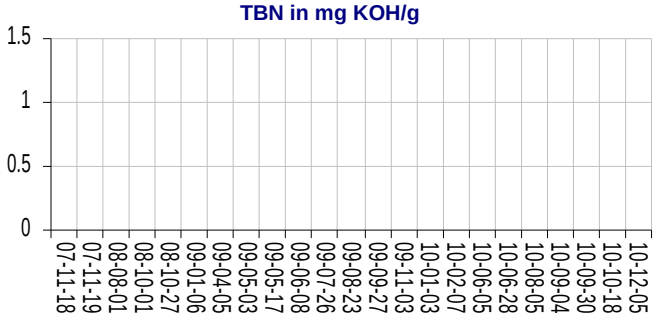


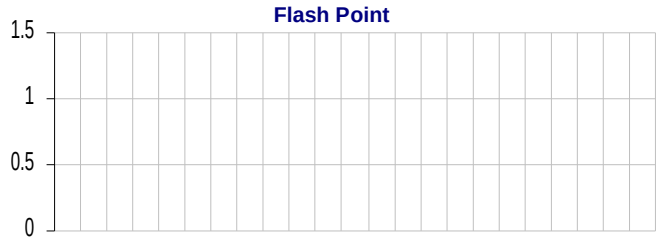












CUSTOMER
Code : **25038**
Name :
Address : Asia Industrial Estate, No.3 Moo2
T.Bangchang, A.Bangchang
Rayong 21130
Site :
Location :
Test code : 884

EQUIPMENT
Unit ID : **291 HW 101 WFE Preflash**
Unit Type : Gearbox General
Unit Make : NORD
Unit Model : SK 103F IEC 225-225 S/4

OIL
Oil type / Viscosity : Shell Cassida GL220
Oil System Capacity : 27.5 Liters

Contamination Condition