CUSTOMER
Code : **28012**
Name :
Address : SYS1: No. 9, I-7 Road, Maptaphut Industrial Estate, Muang, Rayong 21150
Site :
Location :
Test code : G884

EQUIPMENT
Unit ID : **Pinion Stand BD**
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

WARNING W
CAUTION
NORMAL

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

Note abnormal wear metals.
Dirt (silicon) is present and resulting in abrasive wear.
Oil condition tests indicate that the oil is slightly degraded.
Recommend check the oil filters for proper operation and suggest using an off-line filtration system to clean up the oil system.
Recommend resample in 500 hours from the time this sample was taken, to monitor.

Patcharee K. / Wasan C.

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	C	C	C	N	W	C	N
Lab ID			238559			235115			231267		
Bottle ID			1023600			1025409			1023569		
Date Sampled			04-Dec-13			06-Nov-13			04-Oct-13		
Oil Hours (Kms)			Not Given			Not Given			Not Given		
Unit Hours (Kms)			Not Given			Not Given			Not Given		
Oil Change											
Oil Added (Liters)											
Filters Hours (Kms)											
Wear Condition											
Wear Element	**Method**	**Unit**	**Fine(small) Wear**	**Coarse(large) Wear**		**Fine(small) Wear**	**Coarse(large) Wear**		**Fine(small) Wear**	**Coarse(large) Wear**	
Iron	D-6595	PPM	22.5	656.3 W		26.6 C	24.7		28.3 C	249.9 W	
Chromium	D-6595	PPM	0.2	1.2 C		0.2	0.0		0.1	1.3 C	
Lead	D-6595	PPM	0.0	3.0		0.0	1.1		0.0	3.2	
Copper	D-6595	PPM	20.1 W	91.7 W		25.5 W	8.5		26.2 W	70.1 W	
Tin	D-6595	PPM	0.0	29.6 W		0.0	4.8		0.6	16.2 W	
Aluminum	D-6595	PPM	1.3 C	10.1 W		0.7	1.1		1.2 C	8.0 W	
Nickel	D-6595	PPM	0.0	0.3		0.0	1.4		0.2	0.1	
Silver	D-6595	PPM	0.1	0.0		0.1	0.0		0.1	0.0	
Molybdenum	D-6595	PPM	0.0	0.1		0.0	0.0		0.0	0.9	
Titanium	D-6595	PPM	0.0	1.1		0.0	0.8		0.0	1.3	
Oil Condition											
Viscosity @ 40 °C	D-445	cSt	448.7			458.2			462.2		
Viscosity @ 100 °C	D-445	cSt									
Oxidation	FTIR	Abs	4.0 W			4.2 W			4.0 W		
Nitration	FTIR	Abs	3.4			3.9			3.6		
TAN	D-974	mg KOH/g.	0.47			0.44			0.41		
TBN	D-4739	mg KOH/g.									
Contamination											
Water	T-H2O Check™	% (Wt.)	0.029			0.022			0.018		
Sodium	D-6595	PPM	3			4			4		
Silicon	D-6595	PPM	3.3	21.1 W		2.8	0.0		2.5	8.0	
Additive Element											
Boron	D-6595	PPM	0			0			0		
Magnesium	D-6595	PPM	0			1			1		
Calcium	D-6595	PPM	2			2			3		
Barium	D-6595	PPM	0			0			0		
Phosphorus	D-6595	PPM	215			174			162		
Zinc	D-6595	PPM	17	34		19	4		16	16	
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 General SH Omala 460

Reference Oil (RO)	Fine wear U-Caution	Fine wear U-Warning	Coarse wear U-Caution	Coarse wear U-Warning
0	>25	>40	>25	>40
0	>1	>2	>1	>2
0	>45	>80	>50	>90
0	>9	>17	>20	>35
0	>3	>6	>8	>15
0	>1	>2	>3	>6
0	>1	>2	>2	>3
0				
0				
0				

RO	L-Warning	L-Caution	U-Caution	U-Warning
460.0	<414	<437	>483	>506
2.5			>3.1	>3.8
3.4			>4.8	>5.7
0.50			>1	>1.5

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

	Fine wear U-Caution	Fine wear U-Warning	Coarse wear U-Caution	Coarse wear U-Warning
0				
1	>5	>10	>10	>20

RO
8
0
2
0
146
1

RO	L-Caution	L-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
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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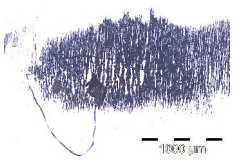
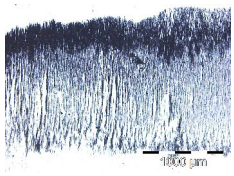
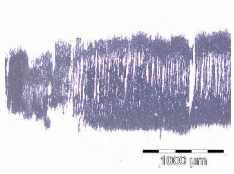
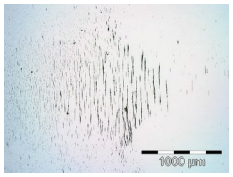
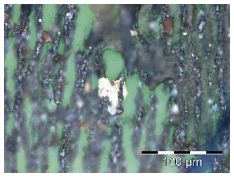
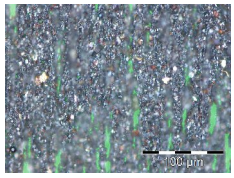
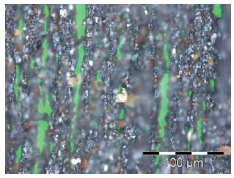
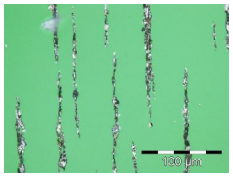
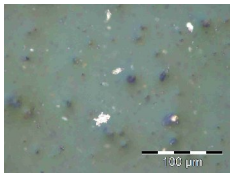
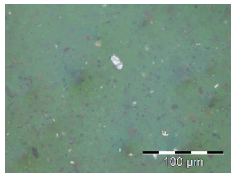
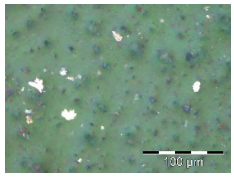
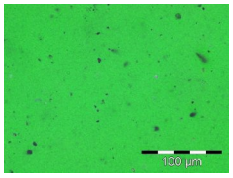
EQUIPMENT
Unit ID : **Pinion Stand BD**
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

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

Copper (bronze or brass) fatigue particles are present.
Black oxides noted in ferrogram.

	Current Sample	Previous Sample		
Lab ID	238559	235115	231267	
Bottle ID	1023600	1025409	1023569	
Date Sampled	04-Dec-13	06-Nov-13	04-Oct-13	
Oil Hours (Kms)	Not Given	Not Given	Not Given	
Unit Hours (Kms)	Not Given	Not Given	Not Given	
Oil Change				
Oil Added (Liters)				
Filters Hours (Kms)				
				ASTM D 7690 M
Wear Condition				
Ferrographic Analysis				**Typical Normal Condition**
Volume of Sample Used	3.00 ml	3.00 ml	3.00 ml	3 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	70	2-3	1	45	2-3	1	45	2-3	1	95	2-3	1
Fatigue Gear Wear	5	5-20	1	10	5-20	1	5	5-30	1			
Fatigue Bearing Wear												
Fatigue Sphere												
Severe Sliding Wear												
Cutting Wear												
Black Oxides	10	5-40	1	30	5-40	1	30	5-40	1			
Red Oxides							5	5-40	1			
Corrosive Wear												
Dirt and Dust	5	5-60	3	5	5-60	3	5	5-60	3	5	5-10	3
Copper	5	5-50	2	5	5-20	2	5	5-30	2			
White Metal	5	5-30	2	5	5-40	2	5	5-20	2			
Ferrographic Analysis Rating (FAR) rating in grade	A B **C** D F			A B **C** D F			A B C **D** F					

%Rating : Percent area covered by wear debris particles or contaminant particles.
Size : Size in micron unit (0.001 mm)
Particle Type :
1 : Ferrous Wear Particles
1.1: Low Alloy 1.2 :Medium Alloy 1.3: High Alloy 1.4 Case Hardened
2 : Non-ferrous Wear Particles
2.1: Copper 2.2 : White Metal 2.3: Babbitting
3 : Contamination Particles
3.1:Fibers

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
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Site :
Location :
Test code : G884

EQUIPMENT
Unit ID : **Pinion Stand BD**
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

Lab ID : 238559 **Date sampled :** 04-Dec-13 **Hours on Oil :** Not Given **Hours on Unit :** Not Given **Bottle ID :** 1023600

ส่วนที่ 1 : หน้าหลัก — Section 1 : Main Page

สังเกต-อนุภาคเศษโลหะสึกหรอที่ผิดปกติ
พบฝุ่นละออง (ซิลิกอน) ส่งผลให้เกิดการสึกหรอแบบขูดขีด (abrasive wear)
ผลทดสอบคุณสมบัติน้ำมัน ชี้ว่าน้ำมันเสื่อมสภาพไปเล็กน้อย
แนะนำให้ตรวจสอบการทำงานของกรองน้ำมัน เพื่อตรวจสอบหาการทำงานที่ผิดปกติ และแนะนำใช้ระบบกรองภายนอกร่วมด้วย เพื่อจัดการให้ระบบน้ำมันสะอาดขึ้น
แนะนำเก็บตัวอย่างซ้ำอีกครั้งภายใน 500 ชั่วโมง หลังจากเก็บตัวอย่างครั้งนี้ เพื่อเฝ้าติดตาม

ส่วนที่ 2 : หน้าของ Particle Count — Section 2 : Particle Count

ส่วนที่ 3 : หน้าของ Ferrographic Analysis — Section 3 : Ferrographic Analysis

พบโลหะคอปเปอร์แบบล้าตัว บนสไลด์เฟอร์โรแกรม (บรอนซ์ หรือ ทองเหลือง)
สังเกต เศษสนิมเหล็กสีดำบนสไลด์เฟอร์โรแกรม

ส่วนที่ 4 : หน้าของ Varnish and Sludge Potential — Section 4 : Varnish and Sludge Potential

ส่วนที่ 5 : หน้าของ Gravimetric Analysis — Section 5 : Gravimetric Analysis

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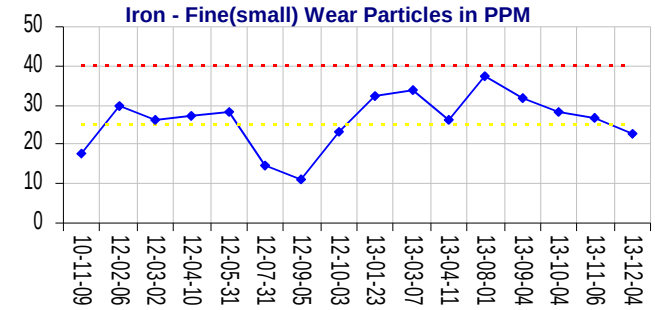
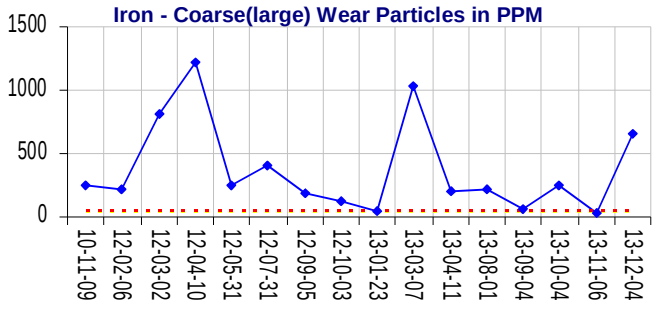
Site :
Location :
Test code : G884

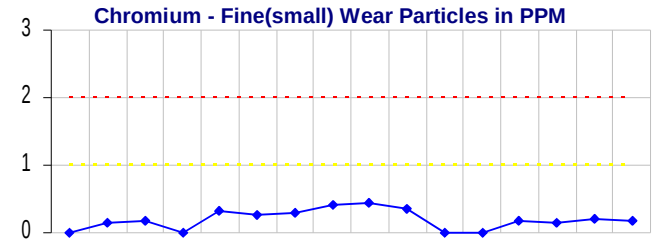
EQUIPMENT
Unit ID : **Pinion Stand BD**
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

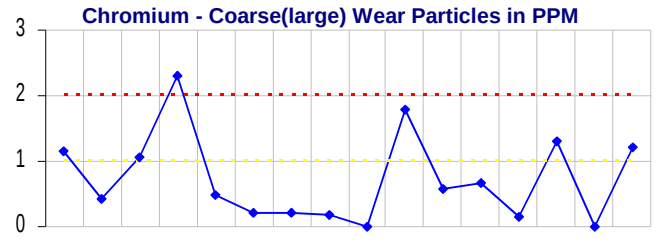
OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

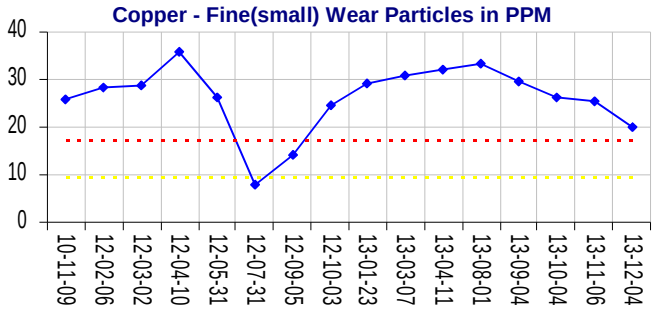
Wear Condition

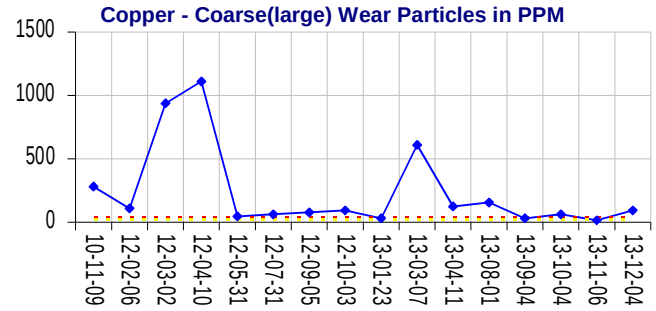


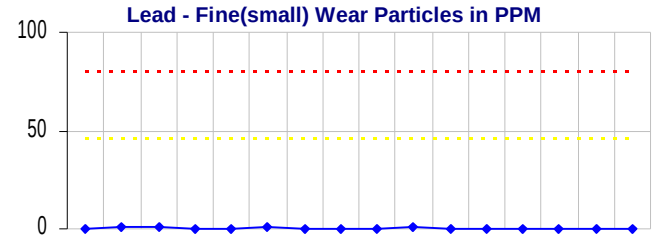


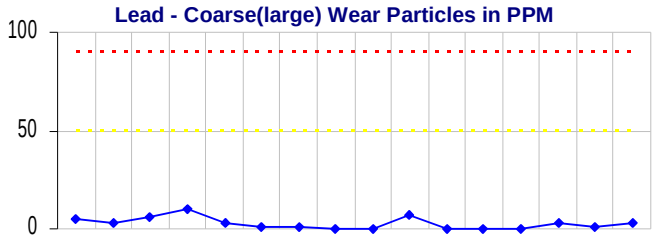


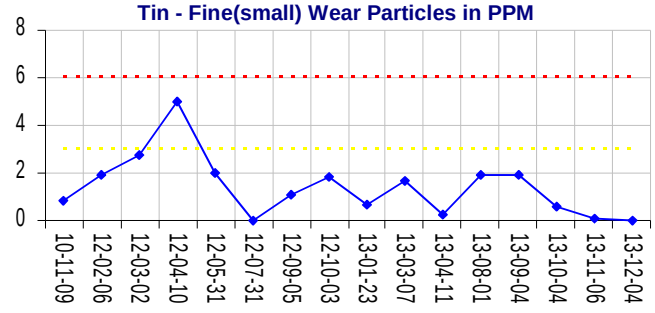


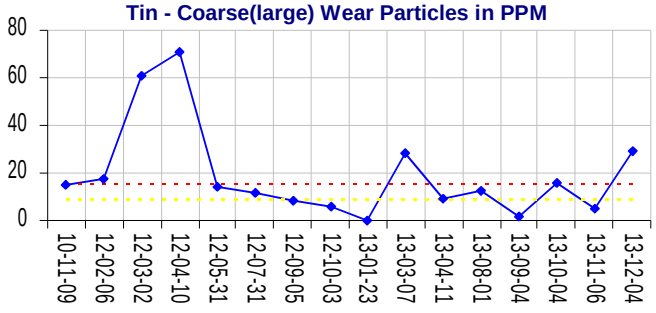












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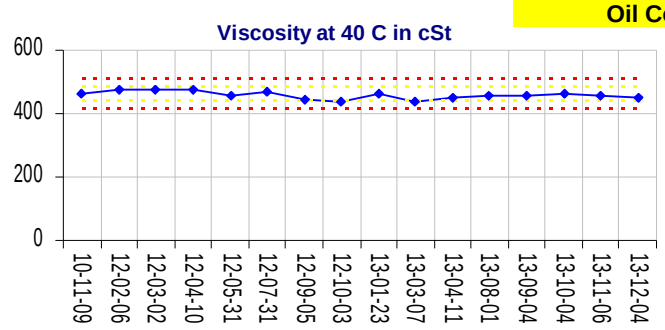
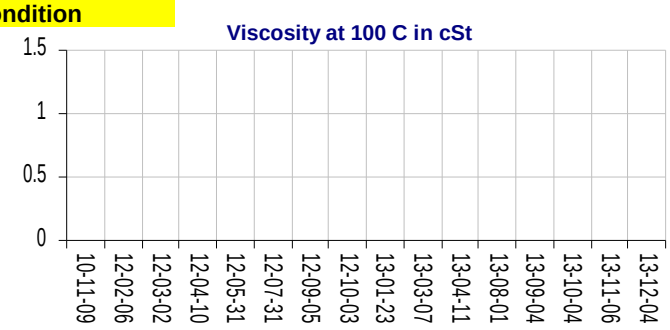
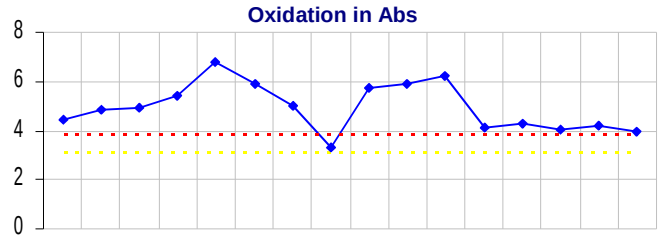
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

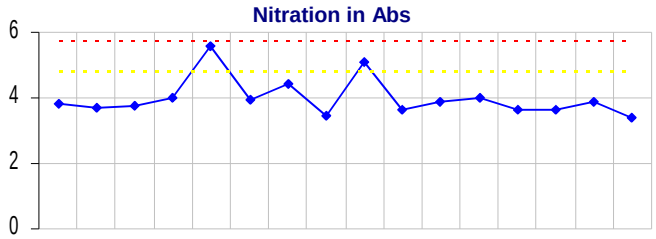
OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

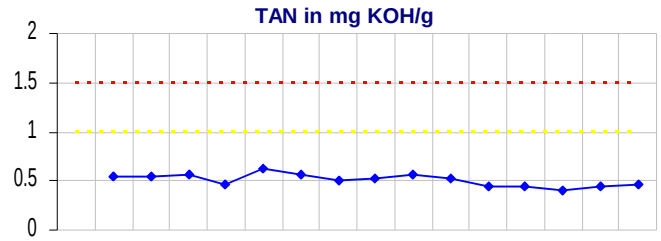
Oil Condition

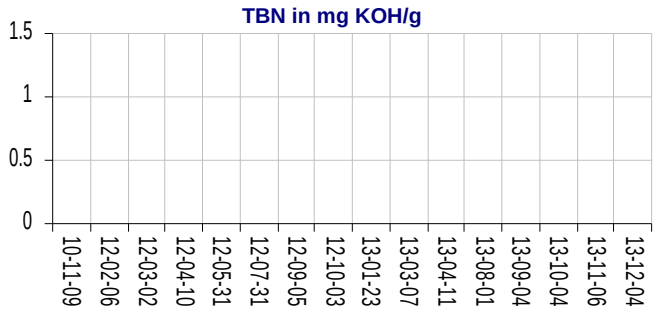


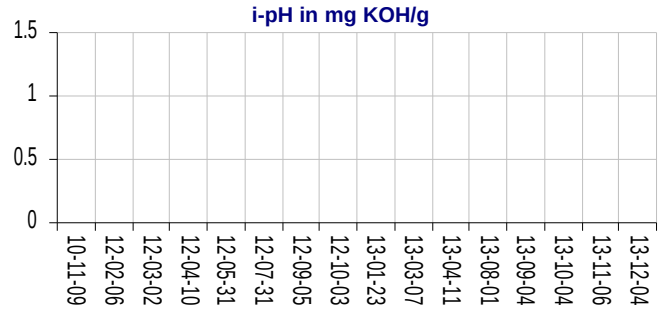












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Test code : G884

EQUIPMENT
Unit ID : **Pinion Stand BD**
Unit Type : Gearbox General
Unit Make : NIPPON STEEL
Unit Model : (not given)

OIL
Oil type / Viscosity : SHELL OMALA ISO 460
Oil System Capacity : 3000 Liters

Contamination Condition