

#### Machine Id **141701-WHEEL SET 34** Component **Gearbox**

# LIEBHERR GEAR HYPOID 90 EP (--- GAL)

### RECOMMENDATION

Resample at the next service interval to monitor.

### WEAR

All component wear rates are normal.

## CONTAMINATION

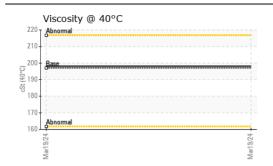
There is no indication of any contamination in the oil.

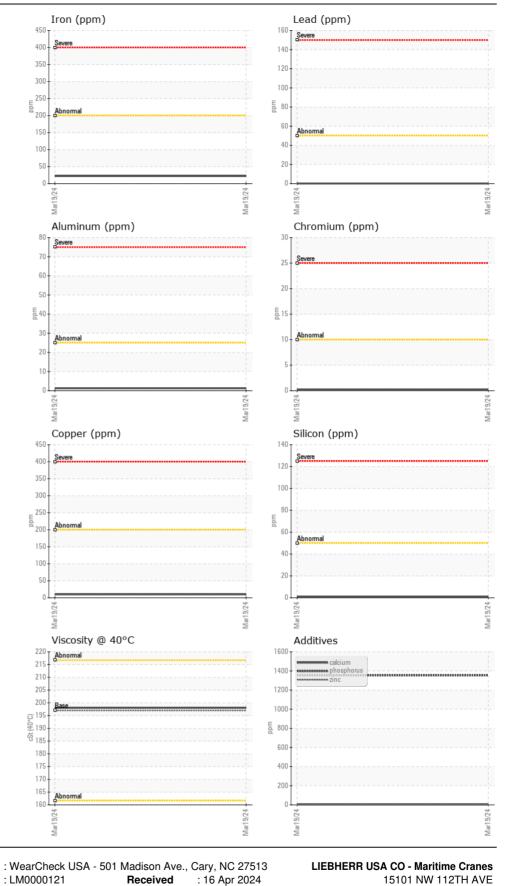
# FLUID CONDITION

The condition of the oil is acceptable for the time in service.

TestUOMMethodLimit/AnCurrentHistory1History2Sample NumberClient Info19 Mar 2024Machine AgehrsClient Info12015Machine AgehrsClient Info2000Filter AgehrsClient Info0Filter AgehrsClient InfoChangedFilter ChangedClient InfoN/ASample StatusClient InfoN/AIronppmASTM D5185m>10c1NickelppmASTM D5185m>101NickelppmASTM D5185m>100SilverppmASTM D5185m>2010SilverppmASTM D5185m>2010TinppmASTM D5185m>100VanadiumppmASTM D5185m>100VanadiumppmASTM D5185m>2010VanadiumppmASTM D5185m>201Vallowbclasta'VisualNONENONESiliconppmASTM D5185m>201Vallowbclasta'VisualNONENONESiliconppmASTM D5185m>202SiliconppmASTM D5185m>20							
Sample DateClient Info19 Mar 2024Machine AgehrsClient Info2000Filter AgehrsClient Info0Gli ChangedClient InfoChangedOil ChangedClient InfoN/AFilter ChangedClient InfoN/AFilter ChangedClient InfoN/ASample StatusNCRMALIronppmASTM D5185m>20022NickelppmASTM D5185m>100NickelppmASTM D5185m>100SilverppmASTM D5185m>500LeadppmASTM D5185m>501VanadiumppmASTM D5185m>100VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501VanadiumppmASTM D5185m>501 <th>Test</th> <th>UOM</th> <th>Method</th> <th>Limit/Abn</th> <th>Current</th> <th>History1</th> <th>History2</th>	Test	UOM	Method	Limit/Abn	Current	History1	History2
Machine Age     hrs     Client Info     12015         Oil Age     hrs     Client Info     2000         Filter Age     hrs     Client Info     0         Oil Changed     Client Info     N/A         Filter Changed     Client Info     N/A         Sample Status     Client Info     N/A         Iron     ppm     ASTM D5185m     >200     22         Nickel     ppm     ASTM D5185m     >10     <1         Silver     ppm     ASTM D5185m     >10     0         Qapper     ppm     ASTM D5185m     >50     0         Aluminum     ppm     ASTM D5185m     >10         Yanadium     ppm     ASTM D5185m     >50     1         Yanadium     ppm     ASTM D5185m     50<	Sample Number		Client Info		LM0000121		
Oil Age     hrs     Client Info     2000         Filter Age     hrs     Client Info     0         Oil Changed     Client Info     N/A         Filter Changed     O     Client Info     N/A         Sample Status     NORMAL          Iron     ppm     ASTM D5185m     >200     22         Chromium     ppm     ASTM D5185m     10     0         Nickel     ppm     ASTM D5185m     >10     0         Aluminum     ppm     ASTM D5185m     >50     0         Lead     ppm     ASTM D5185m     >50     0         Vanaduium     ppm     ASTM D5185m     >50     1         Valed     scalar     'Visual     NONE     NONE         Valeo	Sample Date		Client Info		19 Mar 2024		
Filter Age     hrs     Client Info     0        Oil Changed     Client Info     KA         Filter Changed     Client Info     N/A         Sample Status     NORMAL         Iron     ppm     ASTM D5185m     >200     22         Chromium     ppm     ASTM D5185m     >10     <1         Nickel     ppm     ASTM D5185m     >200     0         Silver     ppm     ASTM D5185m     >25     1         Aluminum     ppm     ASTM D5185m     >200     10         Aluminum     ppm     ASTM D5185m     >50     0         Vanadium     ppm     ASTM D5185m     >50     1         Vanadium     ppm     ASTM D5185m     >20     1         Vanadium     ppm     ASTM D5185m	Machine Age	hrs	Client Info		12015		
Oil Changed     Client Info     Khanged	Oil Age	hrs	Client Info		2000		
Filter Changed Sample Status     Client Info     N/A         Iron     ppm     ASTM D5185m     >200     22         Chromium     ppm     ASTM D5185m     >10     <1         Nickel     ppm     ASTM D5185m     >10     0         Silver     ppm     ASTM D5185m     >10     0         Aluminum     ppm     ASTM D5185m     >250     0         Aluminum     ppm     ASTM D5185m     >50     0         Lead     ppm     ASTM D5185m     >50     0         Vanadium     ppm     ASTM D5185m     >50     0         Vanadium     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >20     2         Yellow Metal     scalar     *Visual	Filter Age	hrs	Client Info		0		
Sample Status     NORMAL         Iron     ppm     ASTM D5185m     >200     22         Chromium     ppm     ASTM D5185m     >10     C1         Nickel     ppm     ASTM D5185m     >10     0         Titanium     ppm     ASTM D5185m     >10     0         Silver     ppm     ASTM D5185m     >10     0         Aluminum     ppm     ASTM D5185m     >50     0	Oil Changed		Client Info		Changed		
Iron     ppm     ASTM D5185m     >200     22         Chromium     ppm     ASTM D5185m     >10     <1         Nickel     ppm     ASTM D5185m     >10     0         Titanium     ppm     ASTM D5185m     0     0         Aluminum     ppm     ASTM D5185m     >25     1         Aluminum     ppm     ASTM D5185m     >20     0         Lead     ppm     ASTM D5185m     >200     10         Vanadium     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >10     0	Filter Changed		Client Info		N/A		
Chromium     ppm     ASTM D5185m     >10     <1	Sample Status				NORMAL		
Chromium     ppm     ASTM D5185m     >10     <1	Iron	nnm	ASTM D5185m	>200	22		
Nickel     ppm     ASTM D5185m     >10     0         Titanium     ppm     ASTM D5185m            Silver     ppm     ASTM D5185m      0         Aluminum     ppm     ASTM D5185m     >20     1         Lead     ppm     ASTM D5185m     >200     10         Copper     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >20     1         Yellow Metal     scalar     *Visual     NONE     I         Silicon     ppm     <							
Titanium     ppm     ASTM D5185m     <1							
Silver     ppm     ASTM D5185m     0         Aluminum     ppm     ASTM D5185m     >25     1         Lead     ppm     ASTM D5185m     >50     0         Copper     ppm     ASTM D5185m     >200     10         Tin     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >10     0         White Metal     scalar     *Visual     NONE     NONE         Yellow Metal     scalar     *Visual     NONE     NONE         Silicon     ppm     ASTM D5185m     >20     2         Water     WC Method     >0.2     NEG         Silit     scalar     *Visual     NONE     NONE         Sand/Dirit     scalar     *Visual     NORM				210	-		
Aluminum     ppm     ASTM D5185m     >25     1        Lead     ppm     ASTM D5185m     >500         Copper     ppm     ASTM D5185m     >200     10         Tin     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >10     0         White Metal     scalar     *Visual     NONE     NONE         Yellow Metal     scalar     *Visual     NONE     NONE         Silicon     ppm     ASTM D5185m     >50     1         Yellow Metal     scalar     *Visual     NONE     NONE         Silicon     ppm     ASTM D5185m     >50     1         Silit     scalar     *Visual     NONE     ILIGHT         Debris     scalar     *							
Lead     ppm     ASTM D5185m     >50     0         Copper     ppm     ASTM D5185m     >200     10         Tin     ppm     ASTM D5185m     >10     0         Vanadium     ppm     ASTM D5185m     >10     0         White Metal     scalar     *Visual     NONE     NONE         Yellow Metal     scalar     *Visual     NONE     NONE         Silicon     ppm     ASTM D5185m     >50     1         Vater     WC Method     >0.2     NEG         Silt     scalar     *Visual     NONE     ILIGHT         Sand/Dirt     scalar     *Visual     NORE     NORE         Appearance     scalar     *Visual     NORM     NORML         Godium     ppm     ASTM D5185m				>25	-		
Copper     ppm     ASTM D5185m     >200     10        Tin     ppm     ASTM D5185m     >10     0        Vanadium     ppm     ASTM D5185m     >10     0        White Metal     scalar     *Visual     NONE         Yellow Metal     scalar     *Visual     NONE     NONE        Silicon     ppm     ASTM D5185m     >50     1        Potassium     ppm     ASTM D5185m     >20     2        Water     WC Method     >0.2     NEG         Silt     scalar     *Visual     NONE     NONE        Debris     scalar     *Visual     NONE     NONE         Sand/Dirt     scalar     *Visual     NORML     NORML         Appearance     scalar     *Visual     NORML     NORML         Godor     scalar     *Visua					-		
TinppmASTM D5185m>100VanadiumppmASTM D5185m0White Metalscalar*VisualNONENONEYellow Metalscalar*VisualNONENONEYellow Metalscalar*VisualNONENONESiliconppmASTM D5185m>501PotassiumppmASTM D5185m>202WaterWC Method>0.2NEGSilitscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNORMLNORMLAppearancescalar*VisualNORMLNORMLGodorscalar*VisualNORMNORMLBoronppmASTM D5185m2MalganeseppmASTM D5185m0ManganeseppmASTM D5185m5PhosphorusppmASTM D5185m1PhosphorusppmASTM D5185m1SoliturppmASTM D5185mMagnesiumppmASTM D5185m<					•		
Vanadium     ppm     ASTM D5185m     0        White Metal     scalar     *Visual     NONE     NONE        Yellow Metal     scalar     *Visual     NONE     NONE        Silicon     ppm     ASTM D5185m     >50     1         Silicon     ppm     ASTM D5185m     >20     2         Water     WC Method     >0.2     NEG         Silt     scalar     *Visual     NONE     LIGHT         Debris     scalar     *Visual     NONE     NONE         Sand/Dirt     scalar     *Visual     NONE     NOREL         Appearance     scalar     *Visual     NORML     NORML         Odor     scalar     *Visual     NORML     NORML         Boron     ppm     ASTM D5185m <th></th> <th></th> <th></th> <th></th> <th>-</th> <th></th> <th></th>					-		
White Metal     scalar     *Visual     NONE     NONE        Yellow Metal     scalar     *Visual     NONE     NONE         Silicon     ppm     ASTM D5185m     >50     1         Potassium     ppm     ASTM D5185m     >20     2         Water     WC Method     >0.2     NEG         Silt     scalar     *Visual     NONE     LIGHT         Debris     scalar     *Visual     NONE     NONE         Sand/Dirt     scalar     *Visual     NORE          Appearance     scalar     *Visual     NORML     NORML         Odor     scalar     *Visual     NORML     NORML         Boron     ppm     ASTM D5185m     <1         Molybdenum     ppm     ASTM D5185m     0				-	•		
SiliconppmASTM D5185m>501PotassiumppmASTM D5185m>202WaterWC Method>0.2NEGSiltscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLSodiumppmASTM D5185mBoronppmASTM D5185m0MalganeseppmASTM D5185m0ManganeseppmASTM D5185m-0MangnesiumppmASTM D5185m-4PhosphorusppmASTM D5185m11ZincppmASTM D5185m-1SulfurppmASTM D5185mSulfurppmASTM D5185m-1MagnesiumppmASTM D5185m-1MagnesiumppmASTM D5185m-1PhosphorusppmASTM D5185m-1 <th></th> <th></th> <th>*Visual</th> <th>NONE</th> <th></th> <th></th> <th></th>			*Visual	NONE			
SiliconppmASTM D5185m>501PotassiumppmASTM D5185m>202WaterWC Method>0.2NEGSiltscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLSodiumppmASTM D5185mBoronppmASTM D5185m0BariumppmASTM D5185m0ManganeseppmASTM D5185m-0MagnesiumppmASTM D5185mPhosphorusppmASTM D5185mZincppmASTM D5185m11SulfurppmASTM D5185mSulfurppmASTM D5185mManganeseppmASTM D5185mPhosphorusppmASTM D5185mSulfurppmASTM D5185m-1PhosphorusppmASTM D5185m<	Yellow Metal	scalar	*Visual	NONE	NONE		
PotassiumppmASTM D5185m>202WaterWC Method>0.2NEGSiltscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLEmulsified Waterscalar*VisualNORMLNORMLSodiumppmASTM D5185m<1BoronppmASTM D5185m0MalgaeseppmASTM D5185m0MagnesiumppmASTM D5185m5PhosphorusppmASTM D5185m1ZincppmASTM D5185m1SulfurppmASTM D5185mSulfurppmASTM D5185m1SulfurppmASTM D5185m1SulfurppmASTM D5185m1SulfurppmASTM D5185m1SulfurppmASTM D5185m1SulfurppmASTM D5185m1 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>							
WaterWC Method>0.2NEGSiltscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLEmulsified Waterscalar*VisualNORMLNORMLSodiumppmASTM D5185m<1BoronppmASTM D5185m0MolybdenumppmASTM D5185m0ManganeseppmASTM D5185m0MagnesiumppmASTM D5185m5PhosphorusppmASTM D5185m1ZincppmASTM D5185m1SulfurppmASTM D5185mMargesiumppmASTM D5185mSulfurppmASTM D5185mPhosphorusppmASTM D5185m1SulfurppmASTM D5185mSolufurppmASTM D5185mSolufurppmASTM D5185m	Silicon	ppm	ASTM D5185m	>50	1		
Siltscalar*VisualNONELIGHTDebrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLEmulsified Waterscalar*Visual>0.2NEGSodiumppmASTM D5185m2BoronppmASTM D5185m0MolybdenumppmASTM D5185m0ManganeseppmASTM D5185m0MagnesiumppmASTM D5185m5PhosphorusppmASTM D5185m11ZincppmASTM D5185m1SulfurppmASTM D5185m1	Potassium	ppm	ASTM D5185m	>20	2		
Debrisscalar*VisualNONENONESand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLOdorscalar*VisualNORMLNORMLDdorscalar*VisualNORMLNORMLEmulsified Waterscalar*Visual>0.2NEGSodiumppmASTM D5185m<1BoronppmASTM D5185m2BariumppmASTM D5185m0MolybdenumppmASTM D5185m0MagnesiumppmASTM D5185m0MagnesiumppmASTM D5185m5PhosphorusppmASTM D5185m11SulfurppmASTM D5185m1SulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185mSulfurppmASTM D5185m <th>Water</th> <th></th> <th>WC Method</th> <th>&gt;0.2</th> <th>NEG</th> <th></th> <th></th>	Water		WC Method	>0.2	NEG		
Sand/Dirt     scalar     *Visual     NONE     NORML     NORML        Appearance     scalar     *Visual     NORML     NORML         Odor     scalar     *Visual     NORML     NORML         Emulsified Water     scalar     *Visual     >0.2     NEG         Sodium     ppm     ASTM D5185m      <1         Boron     ppm     ASTM D5185m     2          Barium     ppm     ASTM D5185m     0          Malganese     ppm     ASTM D5185m     0          Magnesium     ppm     ASTM D5185m     0          Phosphorus     ppm     ASTM D5185m     0         Magnesium     ppm     ASTM D5185m     5         Phosphorus     ppm     ASTM D5185m	Silt	scalar	*Visual	NONE	LIGHT		
Appearancescalar*VisualNORMLNORMLNORMLOdorscalar*VisualNORMLNORMLEmulsified Waterscalar*Visual>0.2NEGSodiumppmASTM D5185m<1BoronppmASTM D5185m2BariumppmASTM D5185m0MolybdenumppmASTM D5185m0ManganeseppmASTM D5185m0MagnesiumppmASTM D5185m4PhosphorusppmASTM D5185m1353ZincppmASTM D5185m1SulfurppmASTM D5185mSulfurppmASTM D5185m	Debris	scalar	*Visual	NONE	NONE		
Odor     scalar     *Visual     NORML     NORML        Emulsified Water     scalar     *Visual     >0.2     NEG         Sodium     ppm     ASTM D5185m      <1         Boron     ppm     ASTM D5185m     2         Barium     ppm     ASTM D5185m     0         Molybdenum     ppm     ASTM D5185m     0         Manganese     ppm     ASTM D5185m     0         Magnesium     ppm     ASTM D5185m     0         Phosphorus     ppm     ASTM D5185m     0         Phosphorus     ppm     ASTM D5185m     4         Phosphorus     ppm     ASTM D5185m     5         Zinc     ppm     ASTM D5185m     1         Sulfur     ppm     ASTM D5185m     1 <th>Sand/Dirt</th> <th>scalar</th> <th>*Visual</th> <th>NONE</th> <th>NONE</th> <th></th> <th></th>	Sand/Dirt	scalar	*Visual	NONE	NONE		
Emulsified Water     scalar     *Visual     >0.2     NEG        Sodium     ppm     ASTM D5185m     <1         Boron     ppm     ASTM D5185m     2         Barium     ppm     ASTM D5185m     0         Molybdenum     ppm     ASTM D5185m     0         Manganese     ppm     ASTM D5185m     0         Magnesium     ppm     ASTM D5185m     0         Calcium     ppm     ASTM D5185m     5         Phosphorus     ppm     ASTM D5185m     1353         Zinc     ppm     ASTM D5185m     1         Sulfur     ppm     ASTM D5185m     1	Appearance	scalar	*Visual	NORML	NORML		
Sodium     ppm     ASTM D5185m     <1	Odor	scalar	*Visual	NORML	NORML		
Boron     ppm     ASTM D5185m     2        Barium     ppm     ASTM D5185m     0        Molybdenum     ppm     ASTM D5185m     0        Molybdenum     ppm     ASTM D5185m     0        Manganese     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     4        Calcium     ppm     ASTM D5185m     5        Phosphorus     ppm     ASTM D5185m     1353        Zinc     ppm     ASTM D5185m     1        Sulfur     ppm     ASTM D5185m     1	Emulsified Water	scalar	*Visual	>0.2	NEG		
Boron     ppm     ASTM D5185m     2        Barium     ppm     ASTM D5185m     0        Molybdenum     ppm     ASTM D5185m     0        Manganese     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     0        Calcium     ppm     ASTM D5185m     4        Phosphorus     ppm     ASTM D5185m     5        Zinc     ppm     ASTM D5185m     1353        Sulfur     ppm     ASTM D5185m     1	Sodium	ppm	ASTM D5185m		<1		
Molybdenum     ppm     ASTM D5185m     0        Manganese     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     4        Calcium     ppm     ASTM D5185m     5        Phosphorus     ppm     ASTM D5185m     1353        Zinc     ppm     ASTM D5185m     1        Sulfur     ppm     ASTM D5185m     29357	Boron		ASTM D5185m		2		
Manganese     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     4        Calcium     ppm     ASTM D5185m     5        Phosphorus     ppm     ASTM D5185m     1353        Zinc     ppm     ASTM D5185m     1        Sulfur     ppm     ASTM D5185m     1	Barium	ppm	ASTM D5185m		0		
Manganese     ppm     ASTM D5185m     0        Magnesium     ppm     ASTM D5185m     4         Calcium     ppm     ASTM D5185m     5         Phosphorus     ppm     ASTM D5185m     1353         Zinc     ppm     ASTM D5185m     1         Sulfur     ppm     ASTM D5185m     1	Molybdenum	ppm	ASTM D5185m		0		
Calcium     ppm     ASTM D5185m     5         Phosphorus     ppm     ASTM D5185m     1353         Zinc     ppm     ASTM D5185m     1         Sulfur     ppm     ASTM D5185m     1	Manganese		ASTM D5185m		0		
Phosphorus     ppm     ASTM D5185m     1353         Zinc     ppm     ASTM D5185m     1         Sulfur     ppm     ASTM D5185m     29357	Magnesium	ppm	ASTM D5185m		4		
Zinc     ppm     ASTM D5185m     1        Sulfur     ppm     ASTM D5185m     29357	Calcium	ppm	ASTM D5185m		5		
Sulfur     ppm     ASTM D5185m     29357	Phosphorus	ppm	ASTM D5185m		1353		
	Zinc	ppm	ASTM D5185m		1		
Visc @ 40°C cSt ASTM D445 197 198	Sulfur	ppm	ASTM D5185m		29357		
		- 0+	ACTM D445	107	198		

Contact/Location: ANDREAS WILFLING - LIEHIA







Lab Number : 06151365 HIALEAH GARDENS, FL Tested : 18 Apr 2024 Unique Number : 10981443 : 19 Apr 2024 - Sean Felton Diagnosed Test Package : MOBCE Contact: ANDREAS WILFLING Certificate L2367 To discuss this sample report, contact Customer Service at 1-800-237-1369. andreas.wilfling@liebherr.com \* - Denotes test methods that are outside of the ISO 17025 scope of accreditation. T: (305)817-7566 Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

Laboratory

Sample No.

Contact/Location: ANDREAS WILFLING - LIEHIA Page 2 of 2

US 33018

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