

ams

Certificate of Analysis

Page 1 of 16 Analytical Report: AAR36387 Eurofins Sample Number: NJ21AA6569-2 Version: 1



WILO AUSTRALIA PTY LTD 2/29 ALEXANDRA PLACE QLD 4172 QLD, AU Client Account Number: A00493572L0P Eurofins Quote Number: XC8UPH19011202

Eurofins Sample Number NJ21AA6569-2	
Original Received Date: Description:	14-May-2021 Vertical Multistage Centrifugal Pump; Helix V3602-1 + Shaft End Washer (Helix V5202) + Cover Ring (Helix V5202). Product Range: Helix V 22**-1/, Helix V 36**-1/, Helix V 52**-1/ Helix VE 22**-1/, Helix VE 36**-1/, Helix VE 52**-1/
	Helix Excel 22**-1/, Helix Excel 36**-1/, Helix Excel 52**-1/
Containers Submitted:	 4 Unit(s)

Analysis

AS/NZS 4020:2018 Compliance Testing

Refer to Attachment # 1

Method: AS/NZS 4020, Appendix A and in-house method TMP 191100 & TMP 191101 Analysis Date: 20-Jul-2021

Supplemental Information

Samples were tested as received. Specifications (if) reported are as provided by the client.

Accredited for compliance with ISO/IEC 17025:2017- Testing. NATA Accreditation Number 15773.

Contracted Company: Eurofins ams Laboratories (Sydney)

8, Rachael Close, Silverwater, NSW 2128 Australia SampleReceiptAMS@eurofins.com

TGA Licence No: MI-15112007-LI-002191-11 APVMA Licence No: 6139 Questions about this report should be directed to your project manager or the general email listed above.



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Reviewed and electronically signed for Data Reviewer Approval by Sandhya Singh, Department Manager -Chemistry & Toxicology for Eurofins ams Laboratories Pty Ltd, on 12-Oct-2021 09:57:10 UTC+11:00

1. <u>SAMPLE INFORMATION:</u>

Methodology: AS/NZS 4020, Appendix A and in-house method TMP-191100 & TMP-191101

Cross Reference No.:	Eurofins ams Certificate of Analysis Report No.: NJ19AA5851-1 (Tests completed on 31/10/2019)
Interim Reporting:	Not Applicable
Batch No./ Manufacturing Date:	Information not Provided
Product Manufacturer:	Wilo SE Wilopark 1, 44263 Dortmund, Germany
Sampling Organisation:	Wilo Australia Pty. Ltd.
General Composition:	Refer to Section 9
Product Use:	In-Line
Temperature Range:	(-15 - 90)°C
Previous Testing:	Not Applicable
Sample selection for tests:	As provided by the Submitting Organisation

Sample storage conditions:	Prepared and controlled as per AS/NZS 4020, Appendix A
Extracts:	Prepared as per AS/NZS 4020, Appendices C, D, F, G & H
Testing procedure:	Testing is based on the recommended composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied at (20 ± 2) °C to cover a cold water application up to <40°C. NOTE: FINAL VOLUME OF SYSTEM=65L. Test for Growth of Aquatic Micro-organisms, Appendix E, is cross-referenced to Eurofins ams Certificate of Analysis Report No.: NJ19AA5851-1 with non-metallic wetted components (Tests completed on 31/10/2019). Refer to Section 9 for product details.
Volume retention:	~6.5L

2. <u>SUMMARY OF RESULTS</u>:

APPENDIX	RESULTS			
C - TASTE (CLAUSE 6.2)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			
D – APPEARANCE (COLOUR AND TURBIDITY) (CLAUSE 6.3)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			
D – APPEARANCE (ORGANIC COMPOUNDS) (CLAUSE 6.8)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			
E - GROWTH OF AQUATIC MICRO- ORGANISMS (CLAUSE 6.4)	PASSED at 'total immersion' exposure Cross referenced to Eurofins ams Certificate of Analysis Report No.: NJ19AA5851-1 (Tests completed on 31/10/2019)			
F - CYTOTOXIC ACTIVITY (CLAUSE 6.5)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			
G - MUTAGENIC ACTIVITY (CLAUSE 6.6)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			
H - METALS (CLAUSE 6.7)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied			

Based on completion and evaluation of all tests on 12/10/2021, the product, Vertical Multistage Centrifugal Pump; Helix V3602-1 + Shaft End Washer (Helix V5202) + Cover Ring (Helix V5202); <u>fully complied</u> with the test requirements of AS/NZS 4020:2018 to cover a cold water application up to <40°C, at the recommended composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L) with a scaling factor of 0.1 (1/10) applied at (20 ± 2)°C. NOTE: FINAL VOLUME OF SYSTEM=65L.

Testing although determined by the relevant product Standard, is generally recognised for up to 5 years by the certifying body, providing the testing procedures remain the same, and the background information on all wetted parts and the product are adequately documented. Also, the results stated in the report relate to the samples of the product submitted for testing. Any changes in the material formulation and supplier/manufacturer of all wetted items, the process of manufacture, the method of application, or the surface area-to-volume ratio in the end-use, could affect the suitability of the product for use in contact with drinking water, and re-testing may be required before this actual time frame, governed by the completion and evaluation date.

3. <u>TASTE:</u>

Methodology: AS/NZS 4020, *Appendix C* and in-house method TMP-191130.

Exposure: composite; 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L). NOTE: FINAL VOLUME OF SYSTEM=65L

Extraction temperature: (20 ± 2)°C **Scaling factor:** 0.1 (1/10) **Number of Panellists:** 5

No. of samples for Chlorine-free extract: 1 x system

Description	Extract	Test Water	Taste	Taste Description	Test Dilution
			(+ / –)	(No. of tasters)	*(Taste
					intensity)
Test Blank	First 24h	Chlorine-free	NA	NA	NA
	Final 9-day	Chlorine-free	-	_	-
Sample	First 24h	Chlorine-free	NA	NA	NA
	Final 9-day	Chlorine-free	-	_	-
Test Blank	First 24h	Chlorinated	NA	NA	NA
	Final 9-day	Chlorinated	-	_	-
Sample	First 24h	Chlorinated	NA	NA	NA
	Final 9-day	Chlorinated	_	_	_

No. of samples for Chlorinated extract: 1 x system

+ Taste detected — No taste detected NA Not applicable
AS/NZS 4020 test requirement: Minimum of 4 tasters with no discernible taste at the first 1/2 dilution.

Figure in brackets is the number of panellists detecting a taste at this dilution. Note:

- Tasters are given a 14-point scale to describe its intensity, with minimum of 1 as extremely weak, and maximum of >14 as extremely strong. An average of all tasters represents taste intensity.
- 2. First extract becomes final extract.

EVALUATION:

On the basis of these results the samples of this product referred to in this report <u>have complied</u> with the test requirements of AS/NZS 4020:2018, Taste; *Appendix C*.

4.A. <u>APPEARANCE: COLOUR AND TURBIDITY</u>

Methodology: AS/NZS 4020, *Appendix D* and in-house methods TMP-191140 and TMP-191106.

Exposure: composite; 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L). NOTE: FINAL VOLUME OF SYSTEM=65L

Extraction temperature: $(20 \pm 2)^{\circ}$ C **Scaling factor:** 0.1 (1/10)

	a) TRUE Hazer (H	COLOUR: n Units I U)	b) TURBIDITY: Nephelometric Turbidity Units (NTU)		
	First 24h	Final 9-day	First 24h	Final 9-day	
Sample Extract pH (24h) = 5.19	<5	NA	0.44	NA	
Test Blank pH (24h) = 5.13	<5	NA	0.58	NA	
FINAL RESULT	<5	NA	<0.01	NA	
AS/NZS 4020 Test sample requirements	≤5		≤0.	5	

No. of samples tested: 1 x system

< = less than \leq = less than or equal to NA Not applicable First extract becomes final extract

For test a), test extractions were performed by Eurofins |ams. The test extracts were subsequently subcontracted to Eurofins |Environment Testing for assessment (NATA Accreditation No. 1261), Report No. 21-13740. In-house Method based on APHA 2120 B.

EVALUATION:

On the basis of these results the samples of this product referred to in this report <u>have complied</u> with the test requirements of AS/NZS 4020:2018, Appearance (Colour & Turbidity); *Appendix D*.

Attachment #1 - AS/NZS 4020:2018 Compliance Testing Analytical Report: AAR36387, Eurofins Sample Number: NJ21AA6569-2, Version: 1 Page 8 of 16

4.B. <u>APPEARANCE: ORGANIC COMPOUNDS</u>

Methodology: AS/NZS 4020, Appendix D and in-house methods TMP-191140 and TMP-191106.

Refer to Section 4.A for testing conditions (Exposure, Extraction temperature, Scaling factor & No. of

Samples tested)	E	Extract: 9-day			
Organic Compound	Drinking Water	Limit of	Test	Sample	FINAL
	Guideline Maximum	Reporting	Blank	Extract	RESULT
	Allowable	mg/L	mg/L	mg/L	mg/L (ppm)
	Concentration	(ppm)	(ppm)	(ppm)	
	mg/L				
	(ppm)				
¹ Benzene	0.001*	0.001	< 0.001	<0.001	< 0.001
¹ Bromodichloromethane	0.06**	0.001	< 0.001	<0.001	< 0.001
¹ Carbon tetrachloride	0.003*	0.001	< 0.001	<0.001	< 0.001
¹ Chlorobenzene	0.3*	0.00001	< 0.00001	< 0.00001	<0.00001
¹ 1,2-dichlorobenzene	1.5*	0.001	< 0.001	<0.001	<0.001
¹ 1,4-dichlorobenzene	0.04*	0.00001	<0.00001	< 0.00001	<0.00001
¹ 1,2-dichloroethane	0.003*	0.00001	<0.00001	< 0.00001	<0.00001
¹ 1,1-dichloroethene	0.03*	0.001	< 0.001	< 0.001	< 0.001
¹ Cis 1,2-dichloroethene	0.06*	0.00001	<0.00001	< 0.00001	<0.00001
¹ Trans 1,2-dichloroethene	0.06*	0.001	< 0.001	< 0.001	< 0.001
¹ Dibromochloromethane	0.15**	0.001	< 0.001	< 0.001	<0.001
¹ Dichloromethane	0.004*	0.00002	0.00002	0.00003	<0.00002
(methylene chloride)					
¹ 1,4-dioxane	0.05**	0.00005	<0.00005	<0.00005	<0.00005
¹ Epichlorohydrin	0.0005*	0.0004	< 0.0004	< 0.0004	<0.0004
¹ Ethylbenzene	0.3*	0.001	< 0.001	< 0.001	< 0.001
¹ Hexachlorobutadiene	0.0007*	0.0005	<0.0005	<0.0005	<0.0005
² N-Nitrosodimethylamine	0.0001*	0.00001	<0.00001	< 0.00001	<0.00001
(NDMA)					
¹ Plasticisers di(2-	0.009**	0.0005	<0.0005	<0.0005	<0.0005
ethylhexyl) (Phthalate)					
¹ Benzo-(a)-pyrene (PAHs)	0.00001*	0.00001	< 0.00001	<0.00001	<0.00001
¹ Styrene (Vinylbenzene)	0.03*	0.001	< 0.001	<0.001	< 0.001
¹ Tetrachloroethene	0.05*	0.00002	<0.00002	<0.00002	<0.00002
¹ Toluene	0.8*	0.001	< 0.001	<0.001	<0.001
¹ Trichlorobenzenes	0.03*	0.0005	<0.0005	<0.0005	<0.0005
¹ Trichloroethene	0.02**	0.00001	< 0.00001	< 0.00001	< 0.00001
¹ Vinyl chloride	0.0003*	0.00005	<0.00005	<0.00005	<0.00005
¹ Xylene	0.6*	0.003	< 0.003	<0.003	<0.003

*Australian Drinking Water Guideline **NZ Drinking Water Guideline

¹ Test extractions were performed by Eurofins | ams. The test extracts were subsequently subcontracted to Eurofins | Environment Testing, NATA Accreditation No. 1261, Report No. 814133-W. In-house Method based on USEPA 522, 8260D & 8270E.

¹ (Epichlorohydrin) Test extractions were performed by Eurofins |ams. The test extracts were subsequently subcontracted to Eurofins | Eaton, ANSI-ASQ National Accreditation Board/ANAB Accreditation No. AT 1807, Report No. 951880. In-house Method based on USEPA 524.2 Modified.

²Test extractions were performed by Eurofins |ams. The test extracts were subsequently subcontracted to Sydney Water, NATA Accreditation No. 63, Report No. 249268. In-house Method based on USEPA 521.

EVALUATION:

On the basis of these results the samples of this product referred to in this report <u>have complied</u> with the test requirements of AS/NZS 4020:2018, Appearance (Organic Compounds); Appendix D.

5. <u>GROWTH OF AQUATIC MICRO-ORGANISMS:</u>

Methodology: AS/NZS 4020, *Appendix E* and in-house method TMP-191150.

Incubation temperature: $(30 \pm 1)^{\circ}C$

Exposure: 'total immersion'

No. of Samples: 1 x pump components

Component Name	Testing Exposure	Inoculum	* MEAN DISSOLVED OXYGEN
		(mL)	
i) Ring Joint	1/1L	100	0.01
ii) Mechanical Seal	1 / 1L	100	<0.01
iii) EPDM O-ring	2 / 1L	100	0.25
Negative Reference Control	~15,000mm²/1L	100	<0.01
(glass plate)			
Positive Reference Control	~15,000mm²/1L	100	10.68
(paraffin waxed glass plate)			
Test Blank	Blank / 1L	100	7.74 in mg/L as mean
			dissolved oxygen

NA = Not applicable

* Difference from test blank and represents mean of five readings (weeks 5, 5 ½, 6, 6 ½ & 7) AS/NZS 4020 test sample requirements: Less than or equal to 2.4 for MDOD

EVALUATION:

On the basis of these results the samples of this product referred to in this report <u>have complied</u> with the test requirements of AS/NZS 4020:2018, , Growth of Aquatic Micro-organisms; *Appendix E*.

NOTE: Results relate to Eurofins | ams LIMS Reference No. NJ19AA5851-1 (Tests completed on 31/10/2019)

6. <u>CYTOTOXIC ACTIVITY:</u>

Methodology: AS/NZS 4020, *Appendix F* and in-house method TMP-191160.

Exposure: composite; 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 ($^{6.5L}$) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L). NOTE: FINAL VOLUME OF SYSTEM=65L

Extraction temperature: $(20 \pm 2)^{\circ}$ CScaling factor: 0.1 (1/10)Extracts: 24h, 48h & 72hNo. of samples tested: $1 \times system$

The test sample extracts from the product, as well as the test blank (test water) were used to prepare a nutrient growth medium, subsequently utilised to grow a monkey kidney cell line (VERO ATCC CCL 81).

Microscopic Examination	Test Sample Extract (24h, 48h and 72h)	Test Blank (24h, 48h and 72h)
Cell Morphology:	Satisfactory	Satisfactory
Monolayer: Confluence/Healthy Growth as ~%	100%	100%

Cytotoxicity was detected with Zinc Sulphate, used as a positive control and analysed at 0.4mM of Zinc. Water for Irrigation was included with the test blank as negative control.

AS/NZS 4020 test sample requirements: 1) Non-cytotoxic response- confluent monolayer similar to test blank. 2) Cytotoxic response- irregularly shaped colls & coll

2) Cytotoxic response- irregularly shaped cells & cell death similar to positive control 0.4mM Zinc Sulphate.

EVALUATION:

On the basis of these results the samples of this product referred to in this report <u>have complied</u> with the test requirements of AS/NZS 4020:2018, Cytotoxic Activity; *Appendix F*.

7. <u>MUTAGENIC ACTIVITY:</u>

Methodology: AS/NZS 4020, Appendix G and in-house method TMP-191170.

Exposure: composite; 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L). NOTE: FINAL VOLUME OF SYSTEM=65L.

Extraction temperature: $(20 \pm 2)^{\circ}$ CScaling factor: 0.1 (1/10)Extract: 24bNo. of samples tested: 1 x system

			110.01	samples lested. 1 x	System		-
	Salmonella typhimurium		Std		Salmonella typhimurium		Std
-59	TA98	Mean	Deviation	+ 59	TA98	Mean	Deviation
-ve c	35			-ve c	46		
	49	41	7		46	44	4
	40				39		
2,4-DNPH	91			2-AA	108		
	102	122	44		200	132	60
	172				88		
T.BLK	32			T.BLK	56		
	37	39	9		57	57	2
	49				59		
Sample	57			Sample	47		
	39	49	9		44	48	5
	52				53		

	Salmonella typhimurium		Std		Salmonella typhimurium		Std
-S9	TA102	Mean	Deviation	+ S9	TA102	Mean	Deviation
-ve c	536			-ve c	632		
	936	699	210		640	616	35
	624				576		
2,4-DNPH	520			Benzo(a)pyrene	768		
	552	544	21		544	587	164
	560				448		
T.BLK	512			T.BLK	320		
	504	515	12		224	293	61
	528				336		
Sample	504			Sample	456		
	664	619	100		424	453	28
	688				480		
S9 = * Metabo	lic Activator		NA = No	t applicable	> = greate	r than	

2,4-DNPH = 2, 4-dinitrophenylhydrazine

2-AA = 2-aminoanthracene

-ve c = Negative Control

AS/NZS 4020 test sample requirements: (The differences in the mean number of revertants between either of the negative controls and test sample extracts should not exceed two standard deviations (for triplicate analysis)). Positive response: If mean revertants for sample extract outside the range of spontaneous revertants for test strain.

EVALUATION:

On the basis of these results the samples of this product referred to in this report have complied with

the test requirements of AS/NZS 4020:2018, Mutagenic Activity; Appendix G.

Attachment #1 - AS/NZS 4020:2018 Compliance Testing Analytical Report: AAR36387, Eurofins Sample Number: NJ21AA6569-2, Version: 1 Page 12 of 16

8. <u>METALS:</u>

Methodology: AS/NZS 4020, *Appendix H* and in-house methods TMP-191180 and TMP-191230. **Exposure:** composite; 1 x system (system = 'in-the-product' exposure of 1 x Helix V3602 (~6.5L) + 'total immersion' exposure of 1 x each Shaft end washer and Cover ring (Helix V5202) / 10L test water, with the extracts combined to make up 16.5L). NOTE: FINAL VOLUME OF SYSTEM=65L.

Extraction temperature: $(20 \pm 2)^{\circ}$ CScaling factor: 0.1 (1/10)Extracts							
No. of samp	les for I: 1 x system	1	No. of san	nples for II: 1	x system	1	
Element	AS/NZS 4020: Maximum Allowable Concentration mg/L (ppm)	Limit of Reporting mg/L (ppm)	Test Blank mg/L (ppm)	Sample Extract I mg/L (ppm)	Sample Extract II mg/L (ppm)	FINAL RESULT I mg/L (ppm)	FINAL RESULT II mg/L (ppm)
Aluminium ¹ (Al)	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Antimony ¹ (Sb)	0.003	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic ¹ (As)	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium ¹ (Ba)	0.7	0.001	<0.001	0.002	0.002	0.002	0.002
Boron ¹ (B)	1.4	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium ¹ (Cd)	0.002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium ¹ (Cr)	0.05	0.001	<0.001	0.002	<0.001	0.002	<0.001
Copper ¹ (Cu)	2	0.001	<0.001	0.002	0.002	0.002	0.002
lron ¹ (Fe)	0.3	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead ¹ (Pb)	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese ¹ (Mn)	0.1	0.005	<0.005	0.009	0.006	0.009	0.006
Mercury ¹ (Hg)	0.001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum ¹ (Mo)	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel ¹ (Ni)	0.02	0.001	<0.001	0.011	0.005	0.011	0.005
Selenium ¹ (Se)	0.01	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver ¹ (Ag)	0.1	0.001	<0.001	<0.001	<0.001	<0.001	<0.001

< = less than mg/L = milligram per litre ¹ = ICPMS – In-house Method Code: LTM-MET 3040 First extract becomes final extract. NA = Not applicable

Test extractions were performed by Eurofins | ams. The test extracts were subsequently subcontracted to Eurofins | Environment Testing for assessment (NATA Accreditation No. 1261), Report No. 812458-W. In-house Method based on US EPA Method 3010A & US EPA Method 6020B.

EVALUATION: On the basis of these results the samples of this product referred to in this report <u>have</u> complied with the test requirements of AS/NZS 4020:2018, Metals; *Appendix H*.

9.I. <u>PHOTO OF TEST SAMPLE</u>:



9.II. BILL OF MATERIAL (BOM) PRODUCT:

D				
Position	Designation	Material		HELIX V3602-
				1/16/E/KS/400-50
		Volume (mL) ->		6233.439276
			surface (cm ²)	2.1727
1111	PUMP HOUSING	1.4308	1613.1200	0.2588
4610D	O-RING Ø10.5xØ2 EPDM	EP 856 'O'-rings	2.0000	0.0003
9903B	SCREW	1.4401	3.6829	0.0006
9923A	SHAFT NUT	1.4401	21.4000	0.0034
9458	NECK-RING-	FORTRON 1140-L6 SF3001	46.6400	0.0075
2911	SHAFT END WASHER	1.4404	15.9500	0.0026
9459	HYDRAULIC SUPPORT CAP	1.4307	113.8800	0.0183
4610B	O-RING ID.202.80x3.53	EP 856 'O'-rings	72.0000	0.0116
2250	IMPELLER	Stainless Steel AISI 304L / 1.4307	859.2900	0.2757
6515	DRAIN-AND-PRIMING-PLUG	1.4301	23.3100	0.0037
2110	PUMP SHAFT	1.4057		0.0041
3400	SHAFT SLEEVE	TUNGSTEN CARBIDE C9M	28.2000	0.0045
3044A	DIFFUSER WITH BEARING	1.4307	2756.5800	0.4422
3044B	NECK-RING	FORTRON 1140-L6 SF3001	46.6400	0.0150
3044C	BEARING-BUSH	Hilox 961	27.4300	0.0088
2460	SLEEVE SPACER	1.4404	27.7300	0.0044
1150A	DIFFUSER	1.4307	2754.5300	0.4419
1150B	NECK-RING	FORTRON 1140-L6 SF3001	46.6400	0.0075
9130	HOUSING PIPE	1.4301		0.0050
4213A	COVER RING	1.4308	1186.6500	0.1904
6545B	½ STOP RUSH	1.4401	5.5000	0.0009
4271	SHAFT SLEEVE	1.4408	16.1000	0.0026
1154	CENTERING	1.4307	2058.8800	0.3303
2520	THRUST RING IMPELLER/RUSH	1.4404	38.8590	0.0062
6521A	FILLING PLUG	1.4301	11.5000	0.0018
6521B	VENTING SCREW	1.4301	0.1000	0.0000
4610F	O-RING Ø20x Ø2.65	EP 856 'O'-rings	2.6000	0.0004
4610G	O-RING-42.52X2.62	EP 856 'O'-rings	5.5000	0.0009
4610A	O-RING 17X3	EP80/2 'O'-rings	3.0000	0.0005
1170	HYDRAULIC SUPPORT	1.4301	690.3200	0.1107
4213B	STATIONARY RING HOLDER	1.4308	20.8000	0.0033
		TIMO-70 EPDM O rings		
	O RING	'70 EPDM 331 O rings	2.2000	0.0004
4240A		'70 EPDM 291'. O rings		
		Hexoloy SA Dens Dark grey coloured,		
		silicon carbide ceramic		
	STATIONARY RING	3M Silicon Carbide Type 'F' Dark grey	2 2000	0 0004
		coloured	2.2000	0.0004
		eSIC-Q7 Buka27-02' Dark grey coloured		
4240B		silicon carbide ceramic		
4220A	BELLOW	E24 EPDM moulded parts	27.5000	0.0044
4220C	SPRING	1.4401	20.0000	0.0032
		TUNGSTENE CARBIDE		
	ROTARY RING	Hexoloy SA	2 2000	0.0004
		3M Silicon Carbide	2.2000	0.0004
4220B		eSIC-Q7 Buka27-02 silicon carbide		

9.III. BILL OF MATERIAL (BOM) PRODUCT RANGE:

			Pump Designation				
				HELIX V2202-			
Position	Designation	Material		1/16/E/KS/400-		HELIX V5202-	
				50		1/16/E/KS/400-50	
		Valuma (ml)		7127 2002/16		0026 060102	
	volume (mL) ->		surface (cm ²)	1 /127.596240	surface (cm ²)	1 52/10	
1111		1.//308	125/1 7000	0 1758	1912 3/100	0.19//	
4610D	0-RING Ø10 5xØ2 FPDM	EP 856 '0'-rings	2 0000	0.1750	2 0000	0.1044	
00U3B	SCREW	1 ///01	3 6829	0.0005	3 6829	0.0002	
00230	SHAFT NUIT	1.4401	21 /000	0.0003	21 /000	0.000+	
Q//58	NECK-RING-		37 1000	0.0050	/6.6/00	0.0022	
2011	SHAFT END WASHER	1 ///04	16 5000	0.0032	33 3/00	0.0047	
0/50		1.4207	44 1000	0.0023	113 8800	0.0004	
/610B		EP 856 '0'-rings	72 0000	0.0002	72 0000	0.0110	
2250	IMDELLER	Stainless Steel AISI 2001 / 1 /2007	580 3000	0.0101	991 5320	0.0075	
6515		1 //301	8 9000	0.1020	23 3100	0.2010	
2110	PLIMP SHAFT	1.4057	0.5000	0.0012	20.0100	0.0024	
3400	SHAFT SI FFVF	TUNGSTEN CARBIDE C9M	28,2000	0.0040	28,2000	0.0029	
3044A	DIFFUSER WITH BEARING	1.4307	1565.9000	0.2194	2287.6300	0.2326	
3044B	NECK-RING	FORTRON 1140-L6 SF3001	37.1000	0.0052	46.6400	0.0047	
3044C	BEARING-BUSH	Hilox 961	27.4000	0.0038	27.4300	0.0028	
2460	SLEEVE SPACER	1.4404		0.0000	27.7300	0.0028	
1150A	DIFFUSER	1.4307	1546.2000	0.2166	2282.6200	0.2320	
1150B	NECK-RING	FORTRON 1140-L6 SF3001	37.1000	0.0052	46.6400	0.0047	
9130	HOUSING PIPE	1.4301		0.0028		0.0072	
4213A	COVER RING	1.4308	696.0000	0.0975	1915.3373	0.1947	
6545B	½ STOP RUSH	1.4401	5.5000	0.0008	5.5000	0.0006	
4271	SHAFT SLEEVE	1.4408	16.1000	0.0023	16.1000	0.0016	
1154	CENTERING	1.4307	1247.6000	0.1748	3171.8700	0.3224	
2520	THRUST RING IMPELLER/RUSH	1.4404	20.6000	0.0029	50.1700	0.0051	
6521A	FILLING PLUG	1.4301	11.5000	0.0016	11.5000	0.0012	
6521B	VENTING SCREW	1.4301	0.1000	0.0000	0.1000	0.0000	
4610F	O-RING Ø20xØ2.65	EP 856 'O'-rings	2.6000	0.0004	2.6000	0.0003	
4610G	O-RING-42.52X2.62	EP 856 'O'-rings	5.5000	0.0008	5.5000	0.0006	
4610A	O-RING 17X3	EP80/2'O'-rings	3.0000	0.0004	3.0000	0.0003	
1170	HYDRAULIC SUPPORT	1.4301	603.6000	0.0846	679.3300	0.0691	
4213B	STATIONARY RING HOLDER	1.4308	20.8000	0.0029	20.8000	0.0021	
		TIMO-70 EPDM O rings					
	O RING	'70 EPDM 331 O rings	2.2000	0.0003	2.2000	0.0002	
4240A		'70 EPDM 291'. O rings					
		Hexoloy SA Dens Dark grey coloured,					
		silicon carbide ceramic					
	STATIONARY RING	3M Silicon Carbide Type 'F' Dark grey	2 2000	0 0003	2 2000	0 0002	
		coloured	2.2000	0.0003	2.2000	0.0002	
		eSIC-Q7 Buka27-02' Dark grey coloured					
4240B		silicon carbide ceramic					
4220A	BELLOW	E24 EPDM moulded parts	27.5000	0.0039	27.5000	0.0028	
4220C	SPRING	1.4401	20.0000	0.0028	20.0000	0.0020	
		TUNGSTENE CARBIDE					
	ROTARY RING	Hexoloy SA	2 2000	0 0003	2 2000	0 0002	
		3M Silicon Carbide	2.2000	0.0000	2.2000	0.0002	
4220B		eSIC-Q7 Buka27-02 silicon carbide					

9.IV. METALLURGICAL TEST REPORT:

