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 AU

Client Account Number: A00493572L0P
 Eurofins Quote Number: XC8UPH19011202

Eurofins Sample Number NJ21AA6569-1

Original Received Date:	14-May-2021
Description:	Vertical Multistage Centrifugal Pump; Helix V1602-1 + Pump Housing for V1002-1 Product Range: HELIX V 2**-1/..., HELIX V 4**-1/..., HELIX V 6**-1/..., HELIX V 10**-1/..., HELIX V 16**-1/... HELIX VE 2**-1/..., HELIX VE 4**-1/..., HELIX VE 6**-1/..., HELIX VE 10**-1/..., HELIX VE 16**-1/... HELIX Excel 2**-1/..., HELIX Excel 4**-1/..., HELIX Excel 6**-1/..., HELIX Excel 10**-1/..., HELIX Excel 16**-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: 27-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



1. SAMPLE INFORMATION:

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, <i>Appendix A</i>
Extracts:	Prepared as per AS/NZS 4020, <i>Appendices C, D, F, G & H</i>
Testing procedure:	<p>Testing is based on the recommended composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) with a scaling factor of 0.1 (1/10) applied at (65 ± 2)°C to cover a cold and hot water application up to ~65°C. NOTE: FINAL VOLUME OF SYSTEM=32.5L.</p> <p>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).</p> <p>Refer to Section 9 for product details.</p>
Volume retention:	~3.25L

2. SUMMARY OF RESULTS:

APPENDIX	RESULTS
C - TASTE (CLAUSE 6.2)	PASSED at composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) 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 V1602-1 + Pump Housing for V1002-1; fully complied with the test requirements of AS/NZS 4020:2018 to cover a cold and hot water application up to ~65°C, at the recommended composite exposure of 1 x system (system = 'in-the-product' exposure of 1 x Helix V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L) with a scaling factor of 0.1 (1/10) applied at (65 ± 2)°C. NOTE: FINAL VOLUME OF SYSTEM= 32.5L.

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/manufacture 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. TASTE:

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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L). NOTE: FINAL VOLUME OF SYSTEM= 32.5L

Extraction temperature: (65 ± 2)°C **Scaling factor:** 0.1 (1/10) **Number of Panellists:** 5

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

No. of samples for Chlorinated extract: 1 x system

Description	Extract	Test Water	Taste (+ / -)	Taste Description (No. of tasters)	Test Dilution *(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	—	—	—

+ 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:

1. 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 have complied with the test requirements of AS/NZS 4020:2018, Taste; *Appendix C*.

4.A. APPEARANCE: COLOUR AND TURBIDITY

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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L). NOTE: FINAL VOLUME OF SYSTEM= 32.5L

Extraction temperature: $(65 \pm 2)^{\circ}\text{C}$

Scaling factor: 0.1 (1/10)

No. of samples tested: 1 x system

	a) TRUE COLOUR: Hazen Units (HU)		b) TURBIDITY: Nephelometric Turbidity Units (NTU)	
	First 24h	Final 9-day	First 24h	Final 9-day
Sample Extract pH (24h) = 5.77	<2	NA	0.14	NA
Test Blank pH (24h) = 5.24	<2	NA	0.14	NA
FINAL RESULT	<2	NA	<0.01	NA
AS/NZS 4020 Test sample requirements	≤5		≤0.5	

< = less than	≤ = 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. 813982-W. 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 have complied with the test requirements of AS/NZS 4020:2018, Appearance (Colour & Turbidity); *Appendix D*.

4.B. APPEARANCE: ORGANIC COMPOUNDS

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)

Extract: 9-day

Organic Compound	Drinking Water Guideline Maximum Allowable Concentration mg/L (ppm)	Limit of Reporting mg/L (ppm)	Test Blank mg/L (ppm)	Sample Extract mg/L (ppm)	FINAL RESULT 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 (methylene chloride)	0.004*	0.00002	<0.00002	<0.00002	<0.00002
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 (NDMA)	0.0001*	0.00001	<0.00001	<0.00001	<0.00001
¹ Plasticisers di(2-ethylhexyl) (Phthalate)	0.009**	0.0005	<0.0005	<0.0005	<0.0005
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	0.00002	<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. 815797-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.

² Test extractions were performed by Eurofins |ams. The test extracts were subsequently subcontracted to Sydney Water, NATA Accreditation No. 63, Report No. 249485. In-house Method based on USEPA 521.

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, Appearance (Organic Compounds); Appendix D.

5. GROWTH OF AQUATIC MICRO-ORGANISMS:

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

Incubation temperature: (30 ± 1)°C

Exposure: 'total immersion'

No. of Samples: 1 x pump components

Component Name	Testing Exposure	Inoculum (mL)	* MEAN DISSOLVED OXYGEN DIFFERENCE (MDOD) in mg/L
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 (glass plate)	~15,000mm ² / 1L	100	<0.01
Positive Reference Control (paraffin waxed glass plate)	~15,000mm ² / 1L	100	10.68
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 have complied 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. CYTOTOXIC ACTIVITY:

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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L). NOTE: FINAL VOLUME OF SYSTEM= 32.5L

Extraction temperature: (65 ± 2)°C

Scaling factor: 0.1 (1/10)

Extracts: 24h, 48h & 72h

No. of samples tested: 1 x 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 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 have complied with the test requirements of AS/NZS 4020:2018, Cytotoxic Activity; *Appendix F*.

7. **MUTAGENIC ACTIVITY:**

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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L). NOTE: FINAL VOLUME OF SYSTEM= 32.5L.

Extraction temperature: (65 ± 2)°C

Scaling factor: 0.1 (1/10)

Extract: 24h

No. of samples tested: 1 x system

-S9	<i>Salmonella typhimurium</i> TA98	Mean	Std Deviation	+ S9	<i>Salmonella typhimurium</i> TA98	Mean	Std Deviation
-ve c	34 33 27	31	4	-ve c	45 44 51	47	4
2,4-DNPH	331 249 279	286	41	2-AA	208 302 291	267	51
T.BLK	42 33 29	35	7	T.BLK	141 157 173	157	16
Sample	32 33 30	32	2	Sample	43 45 47	45	2

-S9	<i>Salmonella typhimurium</i> TA102	Mean	Std Deviation	+ S9	<i>Salmonella typhimurium</i> TA102	Mean	Std Deviation
-ve c	112 211 182	168	51	-ve c	491 437 443	457	30
2,4-DNPH	892 834 870	865	29	Benzo(a)pyrene	981 970 990	980	10
T.BLK	178 108 112	133	39	T.BLK	494 468 469	477	15
Sample	133 132 129	131	2	Sample	432 453 465	450	17

+ S9 = * Metabolic Activator

NA = Not applicable

> = greater 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*.

8. METALS:

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 V1602-1 (~3.25L) + 'total immersion' exposure of 1 x Pump Housing (Helix V1002-1) / 10L test water, with the extracts combined to make up 13.25L). NOTE: FINAL VOLUME OF SYSTEM= 32.5L.

Extraction temperature: (65 ± 2)°C

Scaling factor: 0.1 (1/10)

Extracts: 24h

No. of samples for I: 1 x system

No. of samples for II: 1 x system

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	0.001	<0.001	0.001	<0.001
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	<0.001	<0.001	<0.001	<0.001
Copper ¹ (Cu)	2	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron 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	<0.005	<0.005	<0.005	<0.005
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	<0.001	0.002	<0.001	0.002
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. 813982-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 have complied with the test requirements of AS/NZS 4020:2018, Metals; *Appendix H*.

9.I. PHOTO OF TEST SAMPLE:



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

Position	Designation	Material		
				HELIX V1602-1
			Volume (mL) ->	4482.88529
			surface (cm ²)	1.8355
1111	PUMP HOUSING	1.4301	1799.1100	0.4013
1150	STAGE CASING WITH RETURN GUIDE	1.4307	1038.6100	0.2317
1150A	NECK RING	FORTRON 1140-L6 SF3001	36.8000	0.0082
1154A	DISCHARGE CHAMBER WITH RETURN GUIDE VANE	1.4307	1084.2600	0.2419
1160	STAGE CASING WITHOUT RETURN GUIDE	1.4307	778.5200	0.1737
1160A	NECK RING	FORTRON 1140-L6 SF3001	36.8000	0.0082
2110	PUMP SHAFT	1.4301	103.6700	0.0231
2250	IMPELLER	1.4307	835.6000	0.1864
2410	SPACER	1.4307	110.3200	0.0246
2460A	SLEEVE SPACER	1.4301	18.0000	0.0040
2520	THRUST RING IMPELLER/RUSH	1.4404	25.0000	0.0056
2911	SHAFT END WASHER	1.4404	5.0000	0.0011
3044	BEARING STAGE CASING WITH RETURN GUIDE VANE	1.4307	1038.6100	0.2317
3044A	NECK RING	FORTRON 1140-L6 SF3001	36.8000	0.0082
3400	SHAFT SLEEVE	TUNGSTEN CARBIDE	9.0000	0.0020
4213A	ASSEMBLED RING COVER	1.4301	254.0000	0.0567
4213B	RING HOLDER	1.4308	18.0000	0.0040
4220A	stationary seal : Ring	3MSilicon Carbide TUNGSTEN CARBIDE	1.0000	0.0002
4220B	stationary seal : Bellows	EPDM E3	30.1000	0.0067
4220C	stationary seal : Spring	1.4571 1.4401	33.4000	0.0075
4240A	rotating seal : O'Ring	TIMO-70'O'-rings	9.8000	0.0022
4240B	rotating seal : Ring	EK2230	22.6000	0.0050
4271	SHAFT SLEEVE	1.4404	11.0000	0.0025
4610A	O'RING	EPDM EP1/1/5	2.0000	0.0004
4610B	O'RING	EPDM EP1/1/5	52.0000	0.0116
4610C	O'RING	EPDM EP1/1/5	3.3000	0.0007
4610D	O'RING	EPDM EP1/1/5	2.0000	0.0004
4610F	O'RING	EPDM EP 856	2.3000	0.0005
4610G	O'RING	EPDM EP 856	5.1000	0.0011
4610K	O'RING	EPDM EP80/2	24.0000	0.0054
6515	DRAIN AND PRIMING PLUG G3/8"	1.4404	18.3000	0.0041
6545-A-B	1/2 STOP RUSH	1.4404	3.2000	0.0007
6521B	FILING PLUG G3/8"	1.4404	10.0000	0.0022
6521A	FILING PLUG G3/8"	1.4404	1.0000	0.0002
9130	HOUSING-PIPE	1.4301	747.0833	0.1667
9923A	INFERIOR NUT	1.4404	22.0000	0.0049

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

Position	Designation	Material	Pump Designation			
				HELIX V202-1		HELIX V402-1
			Volume (ml)->	3611.054059		3611.054059
			surface (cm ²)	1.6617	surface (cm ²)	1.6461
1111	PUMP HOUSING	1.4301	1518.3000	0.4205	1518.3000	0.4205
1150	STAGE CASING WITH RETURN GUIDE	1.4307	672.9800	0.1864	678.8600	0.1880
1150A	NECK RING	FORTRON 1140-L6 SF3001	14.3600	0.0040	14.3600	0.0040
1154A	DISCHARGE CHAMBER WITH RETURN GUIDE VANE	1.4307	977.5500	0.2707	880.9600	0.2440
1160	STAGE CASING WITHOUT RETURN GUIDE	1.4307	460.6800	0.1276	460.6800	0.1276
1160A	NECK RING	FORTRON 1140-L6 SF3001	14.3600	0.0040	14.3600	0.0040
2110	PUMP SHAFT	1.4301	89.6000	0.0248	89.6000	0.0248
2250	IMPELLER	1.4307	429.0400	0.1188	457.3600	0.1267
2410	SPACER	1.4307	41.3000	0.0114	41.3000	0.0114
2460A	SLEEVE SPACER	1.4301	18.0000	0.0050	18.0000	0.0050
2520	THRUST RING IMPELLER/RUSH	1.4404	25.0000	0.0069	25.0000	0.0069
2911	SHAFT END WASHER	1.4404	5.0000	0.0014	5.0000	0.0014
3044	BEARING STAGE CASING WITH RETURN GUIDE VANE	1.4307	672.9800	0.1864	678.8600	0.1880
3044A	NECK RING	FORTRON 1140-L6 SF3001	14.3600	0.0040	14.3600	0.0040
3400	SHAFT SLEEVE	TUNGSTEN CARBIDE	9.0000	0.0025	9.0000	0.0025
4213A	ASSEMBLED RING COVER	1.4301	254.0000	0.0703	254.0000	0.0703
4213B	RING HOLDER	1.4308	18.0000	0.0050	18.0000	0.0050
4220A	stationary seal : Ring	3M Silicon Carbide TUNGSTEN CARBIDE	1.0000	0.0003	1.0000	0.0003
4220B	stationary seal : Bellows	EPDM E3	30.1000	0.0083	30.1000	0.0083
4220C	stationary seal : Spring	1.4571 1.4401	33.4000	0.0092	33.4000	0.0092
4240A	rotating seal : O'Ring	TIMO-70 'O'-rings	9.8000	0.0027	9.8000	0.0027
4240B	rotating seal : Ring	EK2230	22.6000	0.0063	22.6000	0.0063
4271	SHAFT SLEEVE	1.4404	11.0000	0.0030	11.0000	0.0030
4610A	O'RING	EPDM EP1/1/5	2.0000	0.0006	2.0000	0.0006
4610B	O'RING	EPDM EP1/1/5	52.0000	0.0144	52.0000	0.0144
4610C	O'RING	EPDM EP1/1/5	3.3000	0.0009	3.3000	0.0009
4610D	O'RING	EPDM EP1/1/5	2.0000	0.0006	2.0000	0.0006
4610F	O'RING	EPDM EP 856	2.3000	0.0006	2.3000	0.0006
4610G	O'RING	EPDM EP 856	5.1000	0.0014	5.1000	0.0014
4610K	O'RING	EPDM EP80/2	24.0000	0.0066	24.0000	0.0066
6515	DRAIN AND PRIMING PLUG G3/8"	1.4404	18.3000	0.0051	18.3000	0.0051
6545-A-B	1/2 STOP RUSH	1.4404	3.2000	0.0009	3.2000	0.0009
6521B	FILING PLUG G3/8"	1.4404	10.0000	0.0028	10.0000	0.0028
6521A	FILING PLUG G3/8"	1.4404	1.0000	0.0003	1.0000	0.0003
9130	HOUSING-PIPE	1.4301	513.0346	0.1421	513.0346	0.1421
9923A	INFERIOR NUT	1.4404	22.0000	0.0061	22.0000	0.0061

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

Position	Designation	Material	Volume (ml) ->			
				HELIX V602-1		HELIX V1002-1
				4046.969675		4046.969675
			surface (cm²)	1.6193	surface (cm²)	1.7809
1111	PUMP HOUSING	1.4301	1518.3000	0.3752	1708.4400	0.4222
1150	STAGE CASING WITH RETURN GUIDE	1.4307	786.6500	0.1944	926.9700	0.2291
1150A	NECK RING	FORTRON 1140-L6 SF3001	26.9200	0.0067	26.9200	0.0067
1154A	DISCHARGE CHAMBER WITH RETURN GUIDE VANE	1.4307	887.9300	0.2194	894.1000	0.2209
1160	STAGE CASING WITHOUT RETURN GUIDE	1.4307	577.5700	0.1427	656.0800	0.1621
1160A	NECK RING	FORTRON 1140-L6 SF3001	26.9200	0.0067	26.9200	0.0067
2110	PUMP SHAFT	1.4301	89.6000	0.0221	89.6000	0.0221
2250	IMPELLER	1.4307	529.9800	0.1310	628.8400	0.1554
2410	SPACER	1.4307	83.4800	0.0206	83.4800	0.0206
2460A	SLEEVE SPACER	1.4301	18.0000	0.0044	18.0000	0.0044
2520	THRUST RING IMPELLER/RUSH	1.4404	25.0000	0.0062	25.0000	0.0062
2911	SHAFT END WASHER	1.4404	5.0000	0.0012	5.0000	0.0012
3044	BEARING STAGE CASING WITH RETURN GUIDE VANE	1.4307	786.6500	0.1944	926.9700	0.2291
3044A	NECK RING	FORTRON 1140-L6 SF3001	26.9200	0.0067	26.9200	0.0067
3400	SHAFT SLEEVE	TUNGSTEN CARBIDE	9.0000	0.0022	9.0000	0.0022
4213A	ASSEMBLED RING COVER	1.4301	254.0000	0.0628	254.0000	0.0628
4213B	RING HOLDER	1.4308	18.0000	0.0044	18.0000	0.0044
4220A	stationary seal : Ring	3M Silicon Carbide TUNGSTEN CARBIDE	1.0000	0.0002	1.0000	0.0002
4220B	stationary seal : Bellows	EPDM E3	30.1000	0.0074	30.1000	0.0074
4220C	stationary seal : Spring	1.4571 1.4401	33.4000	0.0083	33.4000	0.0083
4240A	rotating seal : O'Ring	TIMO-70 'O'-rings	9.8000	0.0024	9.8000	0.0024
4240B	rotating seal : Ring	EK2230	22.6000	0.0056	22.6000	0.0056
4271	SHAFT SLEEVE	1.4404	11.0000	0.0027	11.0000	0.0027
4610A	O'RING	EPDM EP1/1/5	2.0000	0.0005	2.0000	0.0005
4610B	O'RING	EPDM EP1/1/5	52.0000	0.0128	52.0000	0.0128
4610C	O'RING	EPDM EP1/1/5	3.3000	0.0008	3.3000	0.0008
4610D	O'RING	EPDM EP1/1/5	2.0000	0.0005	2.0000	0.0005
4610F	O'RING	EPDM EP 856	2.3000	0.0006	2.3000	0.0006
4610G	O'RING	EPDM EP 856	5.1000	0.0013	5.1000	0.0013
4610K	O'RING	EPDM EP80/2	24.0000	0.0059	24.0000	0.0059
6515	DRAIN AND PRIMING PLUG G3/8"	1.4404	18.3000	0.0045	18.3000	0.0045
6545-A-B	1/2 STOP RUSH	1.4404	3.2000	0.0008	3.2000	0.0008
6521B	FILING PLUG G3/8"	1.4404	10.0000	0.0025	10.0000	0.0025
6521A	FILING PLUG G3/8"	1.4404	1.0000	0.0002	1.0000	0.0002
9130	HOUSING-PIPE	1.4301	630.0590	0.1557	630.0590	0.1557
9923A	INFERIOR NUT	1.4404	22.0000	0.0054	22.0000	0.0054

9.IV. METALLURGICAL TEST REPORT:



UNIVERSAL SCIENTIFIC LABORATORY PTY LTD

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UNIT 12, 65 MARIGOLD STREET, REVESBY NSW 2212, AUSTRALIA
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ANALYSIS REPORT

ORIGIN: AMS LABORATORIES P/L
DESCRIPTION: BODY OF HELIX V(E) PUMP
ORDER NO: 7768
ALLOY CODE UNS S30400

REPORT NO: 18/2573
REPORT DATE 12/09/18
LOG BOOK NO: 180626
HEAT NO: WIL1823939

Sample No.	UNITS W/W %										
	C	S	P	Si	Mn	Cr	Ni	Cu	Mo	V	Ti
3	.04	< .01	.02	.28	1.2	18.0	8.7	.26	.16	.07	< .01

SPECIFICATION LIMITS											
MAX:	.08	.030	.045	1.00	2.00	20.0	10.5				
MIN:						18.0	8.0				

ANALYTICAL TECHNIQUE(S)											
Method	P016	P016	E353	M100	M100	M100	M100	M100	M100	M100	M100
MU						.2	.1				

MU= Measurement Uncertainty

REMARKS:

This analysis was performed at 12, 65 Marigold St, Revesby

To the best knowledge of the company the results on this report are correct, however no legal responsibility will be accepted for or arising from their use. Samples were tested as received unless stated otherwise. The report shall not be reproduced unless in full. Measurement uncertainty data are available on request.



Accredited for compliance with ISO/IEC 17025
NATA accredited laboratory No. 482
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*checked
L.K. 19/09/18*

WILLIAM TING
AUTHORISING OFFICER

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