


Report Reference No.: ITL ENV 191024	
Client:	Southern Salmon Lights Ltd.
Test Item:	Submersible Luminaire.
Identification:	Southern Salmon Lights (SSL). Model No.: SSL-0200-01-10.
Project No.:	ITL ENV 191024. Date Of Purchase Order: 20/03/2020.
Testing Started:	23/03/2020. Testing Completed: 25/03/2020.
Testing Location:	Independent Test Laboratories 218A Annex Rd, Middleton, Christchurch 8024, New Zealand.
Test Specification:	AS/NZS 60598.1:2017 + A1:2017, Clause 9.2 Luminaires, Part 1: General requirements and test (IEC 60598-1, Ed. 8.0:2014, MOD). With reference to: AS 60529-2004 (R2018) Degrees of protection provided by enclosures (IP Code) (IEC 60529 Ed 2.1:2001).
Test Result:	The test item PASSED Clause 9.2 only to IP68. Reported compliance decisions do not include Measurement Uncertainty – Refer to General Notes.
Testing Laboratory:	PowerLab Limited 5 Sheffield Crescent, Christchurch 8053, New Zealand.
Tested By:	Signatory:
	
06/04/2020 Brent Pearson	06/04/2020 Manuel Shimasaki
Date Name Signature	Date Name Signature
 <p>All tests reported herein have been performed in accordance with the Laboratory's terms of registration. Laboratory Registration Number: 42</p>	
<p>International Accreditation New Zealand (IANZ) has a Mutual Recognition Arrangement (MRA) with International Laboratory Accreditation Cooperation (ILAC), such that both IANZ and National Association of Testing Authorities, Australia (NATA) recognize accreditations by IANZ and NATA as being equivalent. Users of inspection reports / certificates are recommended to accept inspection reports / certificates in the name of either accrediting body.</p>	
Other Aspects:	
Abbreviations: P = pass F = fail N = not applicable	
This test report relates to the received test sample/s. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.	

AS/NZS 60598.1:2017 + A1:2017, Clause 9.2
 Luminaires, Part 1: General requirements and test
 (IEC 60598-1, Ed. 8.0:2014, MOD).
 With reference to:
AS 60529-2004 (R2018)
 Degrees of protection provided by enclosures (IP Code)
 (IEC 60529 Ed 2.1:2001).

Test item particulars:

Product Type:	Submersible Luminaire.
Dimensions (mm):	400 (Height) x 210 (Diameter).
Mass (kg):	9.8.
Enclosure type:	Thermoplastic.
Class classification:	Class I.
Safety extra low voltage:	Yes.
Protective impedance:	No.
Supply connection:	Three core rubber sheathed flexible cord, H07RN-F 3 x 1.5 mm ² , fitted with 16 A, 250 V plug.
Cord attachment type:	Type Y.
Degree of ingress protection:	IP68.
Thermostat:	No.
Thermal fuse:	No.
Other automatic controls:	No.
Electronic circuits:	Yes.
Safety isolating transformer:	Yes.
Interconnection circuits:	No.

Description of the test item:

The Southern Salmon Lights, model SSL-0200-01-10 was a submersible and suspended luminaire which is submersed underwater was rated to 230 V, 0.8 A, 200 W and IP68 and was intended for commercial use.

The luminaire is submersed in underwater pens with Salmon, it's purpose is to help grow the fish faster and reduce the maturity rate by providing a broader spread of light.

The luminaire was enclosed in a thermoplastic case and lid, the enclosure was filled with transformer fluid. The luminaire was supplied with 30 metre long cord and 16 A plug as per normal use.

Installation does not require internal access to the luminaire.

The Southern Salmon Lights, model SSL-0200-01-10 submersible luminaire was tested to IP68.

Screws, where used, were torqued to 6 Nm as per AS/NZS 60598.1:2017 Section 4; Construction, Clause 4.12.1.

Marking:



General Notes:

1. At the client's request, testing was performed to Clause 9.2 of AS/NZS 60598.1:2017 only.
2. This test report is based on assessment and tests applied to the specific test item(s) supplied. PowerLab Ltd (PLL) / Independent Test Laboratories (ITL) disclaim any and all responsibility or obligation for any other item.
3. The testing was performed on sample of model SSL-0200-01-10 as a representative from Southern Salmon Lights Ltd.
4. NOTE: Reported compliance decisions do not include Measurement Uncertainty.
 - a. For minimum limits - Where measurement is on the limit or above the limit it is deemed to comply. Where measurement is below the limit it is deemed not to comply
 - b. For maximum limits - Where measurement is on the limit or below the limit it is deemed to comply. Where measurement is above the limit it is deemed not to comply
5. National variations to IEC 60598-1 for application in Australia and New Zealand are shown in green type and in Appendix ZZ.
6. (R2018): Standard AS 60529-2004 has been reconfirmed in Australia in 2018 and remains current in New Zealand.

Options/accessories/ancillary equipment:

The equipment was tested without any optional accessory installed. Hence, this report does not cover parameters that are influenced by the installation of optional accessory that might affect safety in the meaning of this standard.

Measurement Uncertainty

Parameter	Range	Instrument accuracy of Measuring Range
Voltage		
- Up to 1000 V	up to 1 kHz	±1.5 %
	1 kHz up to 5 kHz	±2 %
	5 kHz up to 20 kHz	±3 %
	20 kHz and above	±5 %
- 1000 V and above	up to 20 kHz	±3 %
	20 kHz and above	±5 %
Current		
- Up to 5 A	up to 60 Hz	±1.5 %
	above 60 Hz up to 5 kHz	±2.5 %
	5 kHz up to 20 kHz	±3.5 %
	20 kHz and above	±5 %
- Above 5 A	up to 5 kHz	±2.5 %
	5 kHz up to 20 kHz	±3.5 %
	20 kHz and above	±5 %
Leakage (Touch) Current		
	50 Hz up to 60 Hz	±3.5 %
	greater 60 Hz up to 5 kHz	±5 %
	greater 5 kHz up to 100 kHz	±10 %
Power (50/60 Hz)		
	up to 3 kW	±3 %
	above 3 kW	±5 %
Power Factor (50/60 Hz)		
		±0.05
Frequency		
	up to 10 kHz	±0.2 %
Resistance		
	below 1 mΩ	±3 %
	1 mΩ up to 100 mΩ	±5 %
	100 mΩ to 1 MΩ	±3 %
	1 MΩ up to 1 TΩ	±5 %
	above 1 TΩ	±10 %
Temperature		
	- 35 °C to below 100 °C	±2° C
	100 °C up to 500 °C	±3 %
	below - 35 °C	±3° C
Time		
	10 ms up to 200 ms	±5 %
	200 ms up to 1 s	±10 ms
	1 s and above	±1 %
Linear dimensions		
	up to 1 mm	±0.05 mm
	1 mm up to 25 mm	±0.1 mm
	25 mm and above	±0.5 %
Mass		
	above 10 g and up to 100 g	±1 %
	100 g up to 5 kg	±2 %
	5 kg and above	±5 %
Force		
	for all values	±6 %
Mechanical Energy		
	for all values ± 10 %	±10 %
Torque		
		±10 %
Angles		
		±1 °
Relative Humidity		
	30 % to 95 % RH	±6 %RH
Barometric Air Pressure		
		±10 kPa
Gas & Fluid Pressure		
	for static measurement	±5 %

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
0	GENERAL INTRODUCTION		Noted
1	TERMS AND DEFINITIONS		Noted
2	CLASSIFICATION OF LUMINAIRES		P
2.1	General		P
2.2	Classification according to type of protection against electric shock..... :	Class I.	P
	Class 0 luminaires not allowed in Australia or New Zealand (AS/NZS 60598.1 Variation addition Appendix ZZ)		Noted
2.3	Classification according to degree of protection against ingress of dust, solid objects and moisture :	IP68.	P
2.4	Classification according to material of supporting surface for which the luminaire is designed		P
	Luminaire suitable for normally flammable surfaces :		N
	Luminaire suitable for non-combustible materials only :		P
2.5	Classification according to the circumstances of use		P
	Luminaire for normal use:		P
	Luminaire for rough service:		N
3	MARKING		NT
9	RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE		P
9.1	General		P
	This section specifies requirements and tests for luminaires classified as resistant to dust, solid objects and moisture in accordance with Section 2, including ordinary luminaires.		Noted
9.2	Tests for ingress of dust, solid objects and moisture	See Appendix 1 to this report for AS 60529 results.	P
	Enclosure of luminaire provides degree of protection against ingress of dust, solid objects and moisture in accordance with classification of luminaire and IP number marked on luminaire	IP68.	P
	NOTE 1 Tests specified in this standard not all identical to tests in IEC 60529 because of technical characteristics of luminaires.		Noted

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
	NOTE 101 A designation of IPX7 or IPX8 is considered unsuitable to water jets (designated by IPX5 or IPX6) and may not comply with requirements for second numeral 5 or 6 unless it is dual coded. (AS/NZS 60598.1 Variation addition Appendix ZZ)		Noted
	Compliance checked by tests specified in 9.2.0 to 9.2.9, and for other IP ratings by appropriate tests in IEC 60529.		P
	Before tests for second characteristic numeral, with exception of IPX8, luminaire complete with lamp(s) switched on and brought to stable operating temperature at rated voltage.		P
	Water for tests at temperature of 15 °C ± 10 C.	Water temperature = 21.6 °C.	P
	Luminaires mounted and wired as in normal use and placed in most unfavourable position, complete with protective translucent covers, if any, for tests of 9.2.0 to 9.2.9.		P
	Where connection is made by plug or similar device, this is regarded as part complete luminaire and included in tests and similarly for any separate controlgear.		P
	For tests of 9.2.3 to 9.2.9, fixed luminaire intended for mounting with body in contact with surface is tested with expanded metal spacer interposed between luminaire and mounting surface. Spacer at least equal in overall size to projection of luminaire, and have dimensions as follows: - Longway of mesh 10 mm to 20 mm - Shortway of mesh 4 mm to 7 mm - Strand width 1,5 mm to 2 mm - Strand thickness 0,3 mm to 0,5 mm - Overall thickness 1,8 mm to 3 mm		Noted
	Luminaires having provision for draining water by means of drain holes mounted with lowest drain hole open unless otherwise specified in manufacturer's installation instructions.	No drain holes.	N
	If installation instructions indicate luminaire is for ceiling or under-canopy mounting, luminaire attached to underside of flat board or plate which extends 10 mm beyond that part of luminaire perimeter in contact with mounting surface.		N
	For recessed luminaires, parts in recess and protruding from recess each tested according to their IP classification as indicated in manufacturer's mounting instructions.		N

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
	For IP2X luminaires, enclosure denotes that part of luminaire containing main part other than the lamp and optical controls		N
	Portable luminaires, wired as in normal use, placed in most unfavourable position of normal use		P
	Glands, if any, tightened with torque equal to two-thirds of that applied to glands in test of 4.12.5	Gland sealed by heatshrink.	N
	Fixing screws of covers, other than hand-operated fixing screws of glass covers, tightened with torque equal to two-thirds of that specified in Table 4.1.		Noted
	Screwed lids tightened with a torque (in Nm) numerically equal to one-tenth of nominal diameter of screw thread (in mm). Screws fixing other caps tightened with torque equal to two-thirds of that specified in Table 4.1.	Screws = 7.4 mm diameter, Recommended Torque = 8.0 Nm, Tightened to 6.0 Nm.	P
	After completion of tests, luminaire withstands electric strength test specified in Section 10	(See appended table).	P
	Inspection shows:		P
	a) no deposit of talcum powder in dust-proof luminaires, such that, if powder were conductive, insulation would fail to meet requirements of this standard;		N
	b) no deposit of talcum powder inside enclosures for dust-tight luminaires;	No dust entered EUT.	P
	c) no trace of water on electrical connections, current-carrying parts or on insulation where it could become hazard for user or surroundings. Exception is SELV conductors where voltage under load < 12 V r.m.s. or 30 V ripple-free d.c. and conductors protected from corrosion	No water entered EUT.	P
	c) 1) For luminaires without drain holes, no water entry.		P
	c) 2) For luminaires with drain holes, water entry including condensation allowed during tests if it can drain out effectively and provided it does not reduce creepage and clearance distances below minimum levels specified in standard;	No drain holes.	N
	d) no trace of water entered in any part of watertight or pressure watertight luminaire;	No water entered EUT.	P
	e) no contact permitted with live parts by relevant test probe for first characteristic IP numeral 2;		P
	e) no entry into luminaire enclosure by relevant test probe for first characteristic IP numerals 3 and 4.		P

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
	e) For luminaires with drain holes in accordance with 4.17 and luminaires with ventilation slots for forced cooling, no contact with live parts permitted through drain holes and ventilation slots with relevant test probe for first characteristic IP numerals 3 and 4;	No drain holes.	N
	f) no trace of water on any part of lamp requiring protection from splashing water as indicated in "information for luminaire design" section of applicable lamp standard;		N
	g) no damage, for example, cracking or breakage of protective shield or glass envelope, such that safety or protection against ingress of moisture is impaired		P
9.2.0	Tests		P
	Solid-object-proof luminaires (IP2X) tested with standard test finger specified in IEC 60529 according to requirements of Sections 8 and 11 of this standard		P
	Luminaires IP2X not required to be tested with sphere in IEC 60529		P
	Solid-object-proof luminaires (IP3X and 4X) tested at every possible point (excluding gaskets) with probe in accordance with test probe C or D of IEC 61032, applied with force as shown in Table 9.1		P
	IP3X, Test probe C, probe wire diameter 2.5 mm, 3 N ± 10 % IP4X, Test probe D, probe wire diameter 1.0 mm, 1 N ± 10 %		P
	The end of probe wire cut at right angles to its length and free from burrs.		P
9.2.1	Dust-proof luminaires (IP5X) tested in dust chamber in which talcum powder maintained in suspension by air current. Chamber contains 2 kg of powder for every cubic metre of volume. Talcum powder used able to pass through square-meshed sieve whose nominal wire diameter is 50 µm and whose nominal free distance between wires is 75 µm. Not have been used for more than 20 tests.		N

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
	<p>Test proceeds as follows:</p> <p>a) Luminaire suspended outside dust chamber and operated at rated supply voltage until operating temperature achieved.</p> <p>b) Luminaire, whilst still operating, placed with minimum disturbance in dust chamber.</p> <p>c) Door of dust chamber is closed.</p> <p>d) Fan/blower causing talcum powder to be in suspension is switched on.</p> <p>e) After 1 min, luminaire switched off and allowed to cool for 3 h whilst talcum powder remains in suspension.</p>		Noted
9.2.2	Dust-tight luminaires (IP6X) tested in accordance with 9.2.1	(See appended table).	P
9.2.3	Drip-proof luminaires (IPX1) subjected for 10 min to artificial rainfall of 1 mm/min, falling vertically from height of 200 mm above top of luminaire.		N
9.2.4	<p>Rain-proof luminaires (IPX3) sprayed with water for 10 min by means of spray apparatus as shown in Figure 7. Radius of semi-circular tube as small as possible and compatible with size and position of luminaire.</p> <p>Tube perforated so that jets of water directed towards centre of circle and water flow rate at inlet of apparatus approximately 0.07 l/min per hole multiplied by number of holes.</p> <p>Tube caused to oscillate through angle of 120°, 60° on either side of vertical, time for one complete oscillation (2 x 120°) being about 4 s.</p> <p>Luminaire mounted above pivot line of tube so that ends of luminaire receive adequate coverage from jets.</p> <p>Luminaire turned about its vertical axis during test at rate of 1 r/min.</p> <p>After this 10 min period, luminaire switched off and allowed to cool naturally whilst water spray continued for further 10 min.</p>		N

AS/NZS 60598.1:2017 + A1			
Clause	Requirement - Test	Result	Verdict
9.2.5	<p>Splash-proof luminaires (IPX4) sprayed from every direction with water for 10 min by means of spray apparatus shown in Figure 7 and described in 9.2.4. Luminaire mounted under pivot line of tube so that ends of luminaire receive adequate coverage from jets.</p> <p>Tube caused to oscillate through angle of almost 360°, 180° on either side of vertical, time for one complete oscillation (2 x 360°) being about 12 s. Luminaire turned about its vertical axis during test at rate of 1 r/min.</p> <p>Support for equipment under test grid shaped in order to avoid acting as baffle.</p> <p>After this 10 min period, luminaire switched off and allowed to cool naturally whilst water spray continued for further 10 min.</p>		N
9.2.6	<p>Jet-proof luminaires (IPX5) switched off and immediately subjected to water jet for 15 min from all directions by means of hose having nozzle with shape and dimensions shown in Figure 8. Nozzle held 3 m away from sample.</p> <p>Water pressure at nozzle adjusted to achieve water delivery rate of 12.5 l/min + 5 % (approximately 30 kN/m²).</p>		N
9.2.7	<p>Powerful water jet-proof luminaires (IPX6) switched off and immediately subjected to water jet for 3 min from all directions by means of hose having nozzle with shape and dimensions shown in Figure 8. Nozzle held 3 m away from sample.</p> <p>Water pressure at nozzle adjusted to achieve water delivery rate of 100 l/min + 5 % (approximately 100 kN/m²).</p>		N
9.2.8	<p>Watertight luminaires (IPX7) switched off and immediately immersed for 30 min in water, so that at least 150 mm of water above top of luminaire and lowest portion subjected to at least 1 m head of water.</p> <p>Luminaires held in position by their normal fixing means.</p> <p>Luminaires for tubular fluorescent lamps positioned horizontally, with diffuser upwards, 1 m below water surface.</p>		N
9.2.9	<p>Pressure watertight luminaires (IPX8) heated either by switching on lamp or by other suitable means, so that temperature of luminaire enclosure exceeds that of water in test tank by between 5 °C and 10 °C.</p> <p>Luminaire then switched off and subjected to water pressure of 1.3 times that pressure which corresponds to rated maximum immersion depth for a period of 30 min.</p>	<p>Max immersion depth = 10 metres.</p> <p>Tested at 1.3 x 10 = 13 metres.</p>	P

APPENDIX 1: AS 60529 Results

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
1	SCOPE AND OBJECT		Noted
2	NORMATIVE REFERENCES		Noted
3	DEFINITIONS		Noted
4	DESIGNATIONS		Noted
5	DEGREES OF PROTECTION INDICATED BY THE FIRST CHARACTERISTIC NUMERAL		P
6	DEGREES OF PROTECTION INDICATED BY THE SECOND CHARACTERISTIC NUMERAL		P
7	DEGREES OF PROTECTION INDICATED BY THE ADDITIONAL LETTER.		N
8	SUPPLEMENTARY LETTERS		N
9	EXAMPLES OF DESIGNATIONS WITH THE IP CODE		Noted
10	MARKING		Noted
11	GENERAL REQUIREMENTS FOR TESTS		P
11.1	Atmospheric conditions for water or dust tests.	Below readings averaged across testing.	P
	Temperature range: 15 °C to 35 °C	Temp 20.3 °C.	P
	Relative humidity: 25 % to 75 %	Humidity 48.8 %RH.	P
	Air pressure: 86 kPa to 106 kPa	Air Pressure 100.7 kPa.	P
11.2	Test samples		Noted
11.3	Application of test requirements and interpretation of test results.		Noted
11.4	Combination of test conditions for the first characteristic numeral.		N
11.5	Empty enclosures.		N
12	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL		P
12.1	Access probes		Noted
12.2	Test conditions		P
12.3	Acceptance conditions		P
12.3.1	For low-voltage equipment <1000 V a.c. or 1500 V d.c.		P
	The access probe shall not touch hazardous live parts		P

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
12.3.2	For high-voltage equipment > 1000 V a.c. > 1500 V d.c.		N
	When the access probe is placed in the most unfavourable position(s), the equipment shall be capable of withstanding the dielectric tests as specified in the relevant product standard applicable to the equipment.		N
	Verification may be made either by dielectric test or by inspection of the specified clearance dimension in air which would ensure that the tests would be satisfactory under the most unfavourable electric field configuration (see IEC 60071-2).		N
12.3.3	For equipment with hazardous mechanical parts	No hazardous mechanical parts.	N
	The access probe shall not touch hazardous mechanical parts		N
	If adequate clearance is verified by a signal circuit between the probe and hazardous parts, the lamp shall not light.		N
13	TESTS FOR PROTECTION AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL		P
13.1	Test means		Noted
13.2	Test conditions for first characteristic numerals 1, 2, 3, 4		P
	The object probe is pushed against any openings of the enclosure with the force specified in table 7.	Or as per AS/NZS 60598.1 Cl 8 and 9.	P
	IP1X Rigid Sphere 50 mm diameter Force 50 N		P
	IP2X Rigid sphere 12.5 mm diameter Force 30 N	10 N as per AS/NZS 60598.1, Cl 8.2.5.	P
	IP3X Rigid steel rod 2.5 mm diameter Force 3 N		P
	IP4X Rigid steel rod 1.0 mm diameter Force 1 N		P
	IP5X Dust Chamber without pressure		N
	IP6X Dust chamber with pressure	Test carried out in accordance with Cl 9.2.2 AS/NZS 60598.1.	P
13.3	Acceptance conditions for first characteristic numerals 1, 2, 3, 4		P
	The protection is satisfactory if the full diameter of the probe specified in table 7 does not pass through any opening.	(See appended table).	P

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
13.4	Dust test for first characteristic numerals 5 and 6	Numeral 6.	P
	The talcum powder sieved through wire diameter 50 µm and gap 75 µm, 2 kg per cubic meter used for less than 20 tests		P
	Category 1 reduced internal air pressure		P
	Category 2 No internal pressure difference		N
	Category 1 enclosures	Unit was tested for 3 hours as per 60598.1, Cl. 9.2.2.	P
	Air extraction rate 40 to 60 x volume with less than 2 kPa test duration 2 h		N
	Air extraction rate less than 40 volumes per hour continued until 80 volumes or 8 hours		N
	Category 2 enclosures	Category 1.	N
	Placed in normal position in chamber any drain hole normally open left open test duration 8 hours		N
13.5	Special conditions for first characteristic numeral 5		N
13.5.1	The enclosure shall be deemed category 1 unless the relevant product standard for the equipment specifies that the enclosure is category 2.		N
13.5.2	The protection is satisfactory if, on inspection, talcum powder has not accumulated in a quantity or location such that, as with any other kind of dust, it could interfere with the correct operation of the equipment or impair safety. Except for special cases to be clearly specified in the relevant product standard, no dust shall deposit where it could lead to tracking along the creepage distances.		N
13.6	Special conditions for first characteristic numeral 6	(See appended table).	P
13.6.1	The enclosure shall be deemed category 1, whether reductions in pressure below the atmospheric pressure are present or not.		P
13.6.2	The protection is satisfactory if no deposit of dust is observable inside the enclosure at the end of the test.	No dust entered EUT.	P
14	TESTS FOR PROTECTION AGAINST WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL		P
14.1	Test means		Noted
	IPX1 Drip box Figure 3 Enclosure on turntable 1 – 1.5 mm/ mm		N
	IPX2 Drip box Figure 3 Enclosure in 4 fixed positions of 15° tilt 3 – 3.5 mm/min 2,5 minutes for each position of tilt		N

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
	IPX3 Oscillating tube Figure 4 Spray $\pm 60^\circ$ from vertical, distance max. 200 mm 0.7 l/minute or		N
	IPX3 Spray nozzle Figure 5 Spray $\pm 60^\circ$ from vertical 10 l/minute		N
	IPX4 As for numeral 3 Spray $\pm 180^\circ$ from vertical		N
	IPX4 Spray nozzle Figure 5 Spray $\pm 180^\circ$ from vertical 12.5 l/minute		N
	IPX5 Water jet hose nozzle Figure 6 Nozzle 6,3 mm diameter, distance 2,5 m to 3 m, 12.5 l/minute		N
	IPX6 Water jet hose nozzle Figure 6 Nozzle 12,5 mm diameter, distance 2,5 m to 3 m 100 l/minute		N
	IPX7 Immersion tank Water-level on enclosure: 0,15 m above top 1 m above bottom		N
	IPX8 Immersion tank Water-level: by agreement	Test carried out in accordance with Cl 9.2.9 AS/NZS 60598.1.	P
14.2	Test conditions		P
	Water temp and sample temperature within 5 K		P
	Condensation within sample not treated as ingress		P
14.2.1	Test for IPX1		N
	Sample fixed as per normal use		N
	Drip box with uniform flow over whole enclosure		N
	Flow rate as per table 8		N
	Turntable speed of 1 r/min about 100 mm eccentric		N
	Duration of test 10 minutes		N
14.2.2	Test for IPX2		N
	Tested for 2.5 minutes in 4 tilted stationary positions		N
	Total duration 10 minutes		N
14.2.3	Test for IPX3		N
	Oscillating Tube flow rate as per table 9		N
	Tube moves 60° either side of vertical 2 x 120° in 4 seconds for 5 minutes.		N
	Sample is rotated 90 degrees horizontally and tested for a further 5 minutes.		N
	b) Spray nozzle preferred when all parts cannot be wet using Tube		N

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
	Shield is in place and flow as per 14.1		N
	Duration of 1 minute per m ² .		N
14.2.4	Test for IPX4		N
	a) Oscillating Tube flow rate as per table 9		N
	Tube moves 2 x 180° either side of vertical in 12 seconds.		N
	Test duration 10 minutes' water flow 12.5 l/min		N
	b) Spray nozzle preferred when all parts cannot be wet using Tube		N
	Shield is removed		N
	Rate and duration as per 14.2.3		N
14.2.5	Test for IPX5		N
	Nozzle of 6.3 mm,		N
	Delivery rate 12.5 l/minute		N
	Stream about 40 mm diameter at 2.5 metres		N
	Test duration 1 minute per sq. metre of enclosure		N
	Distance from Nozzle to enclosure surface		N
14.2.6	Test for IPX6		N
	Nozzle of 12.5 mm,		N
	Delivery rate 100 l/minute		N
	Stream about 120 mm diameter at 2.5 metres		N
	Test duration 1 minute per square metre of enclosure (3 minutes' minimum)		N
	Distance from Nozzle to enclosure surface 2.5 – 3 meters		N
14.2.7	Tests for IPX7		N
	Lowest point of enclosures with a height less than 850 mm, located 1.0 m below surface of the water		N
	Highest point of enclosures with a height equal to or greater than 850 mm, located 0.15 m below surface of the water		N
	Test duration is 30 min		N
	Water temperature does not differ from that of equipment by more than 5 K. However, a modified requirement may be specified by relevant product standard if the equipment is energized/parts in motion.		N

AS 60529-2004 (R2018) (IEC 60529 Ed 2.1:2001)			
Cl.	Requirement - Test	Result	Verdict
14.2.8	Tests for IPX8	Max immersion depth = 10 metres. Tested at 1.3 x 10 = 13 metres as per 60598.1, Cl. 9.2.9. Luminaire enclosure at 8 °C above water temperature before test carried out.	P
14.3	Acceptance conditions		P
	Inspection after a test of 14.2.1 to 14.2.8		P
14.3	Acceptance conditions		P
	Did water enter enclosure	No water entered EUT.	P
	Did equipment pass electrical tests specified by product standard.		P
	Pass fail criteria shall be in accordance with relevant product standard, and subsequent dielectric strength tests. In general:	(See appended table).	P
	if any water has entered, it shall not		Noted
	be sufficient to interfere with the correct operation of the equipment or impair safety;	No water entered EUT.	P
	deposit on insulation parts where it could lead to tracking along the creepage distances	No water entered EUT.	P
	reach live parts or windings not designed to operate when wet	No water entered EUT.	P
	accumulate near the cable end or enter the cable if any	No water entered EUT.	P
15	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER		N
15.1	Access probes.		N
15.2	Test conditions		N
15.3	Acceptance		N

TABLES OF RESULTS

CI 9.2.0 (13.3) Ingress of Solid Objects Test (AS 60529)				P
Ingress Test Performed	Location of probe applied	Force applied (N)	Clearance measured	Verdict
IP1X	Enclosure Join, Cable Gland, Screw Connections.	50	No damage / entry.	P
IP2X	Rubber Cap, Enclosure Clip Join, Clear Plastic Cover.	10	No damage / entry.	P
IP3X	Rubber Cap, Enclosure Clip Join, Clear Plastic Cover.	3	No damage / entry.	P
IP4X	Rubber Cap, Enclosure Clip Join, Clear Plastic Cover.	1	No damage / entry.	P

CI 9.2.2 (13.6) Ingress of Dust Test (AS 60529)					P
EUT identification	Degree of protection (Dust)	Duration of test (hr)	Ambient temperature (°C)	EUT ambient (°C)	Verdict
SSL-0200-01-10	IP6X	3.0	15.1	24.4	P

CI 9.2.9 (14.3) Ingress of Water Test (AS 60529)						P
EUT identification	Degree of protection (Water)	Depth of EUT from surface (m)	Duration of test (min)	Ambient temperature (°C)	Water Ambient temperature (°C)	Verdict
SSL-0200-01-10	IPX8	13.0	30.0	21.6	21.6	P

CI 9.2.0 (14.3) Electric strength after IPX8			P
Test voltage applied between:	Voltage (V)	Breakdown (Yes/No)	
A to Earth	1250	No	
N to Earth	1750	No	
A and N together to Power Cord	3000	No	

Product Photos



Figure 1: Product Overall view.



Figure 2: Product Side view.



Figure 3: Product Top view.



Figure 4: Product Bottom view.



Figure 5: Product Power Cord Marking view.

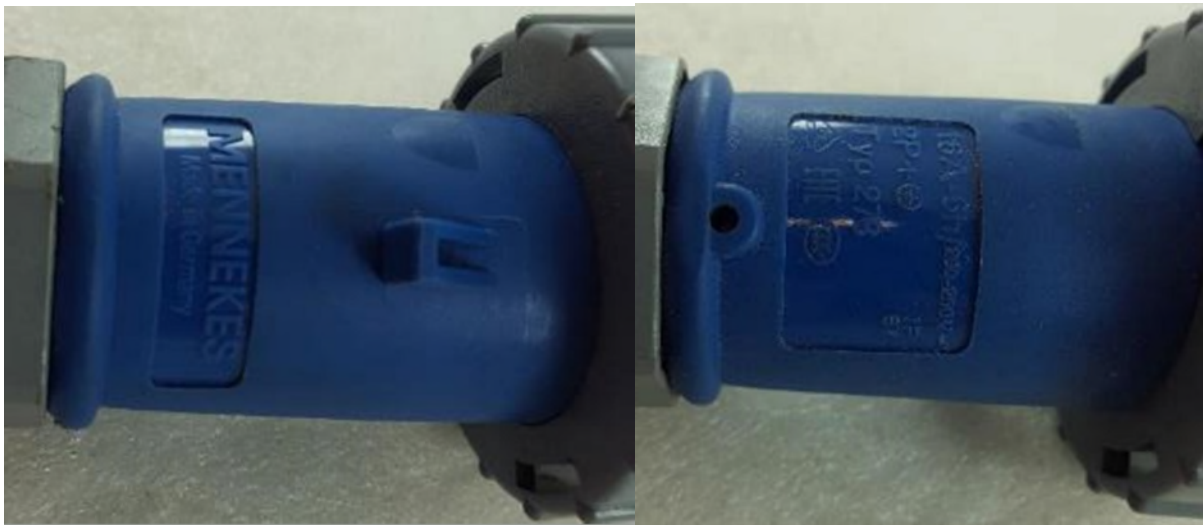


Figure 6: Product Plug Marking view.



Figure 7: Product IP6X Dust Test Setup view.



Figure 8: Product IP6X After Dust Test view.



Figure 9: Product IP6X After Dust Test Inspection view.



Figure 10: Product IP6X After Dust Test Inspection view.

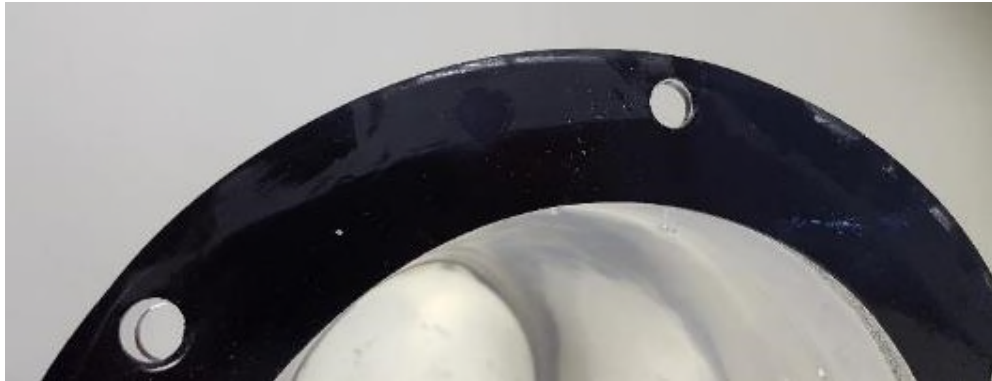


Figure 11: Product IP6X After Dust Test Inspection view.



Figure 12: Product IPX8 Water Test Setup view.



Figure 13: Product IPX8 After Water Test view.

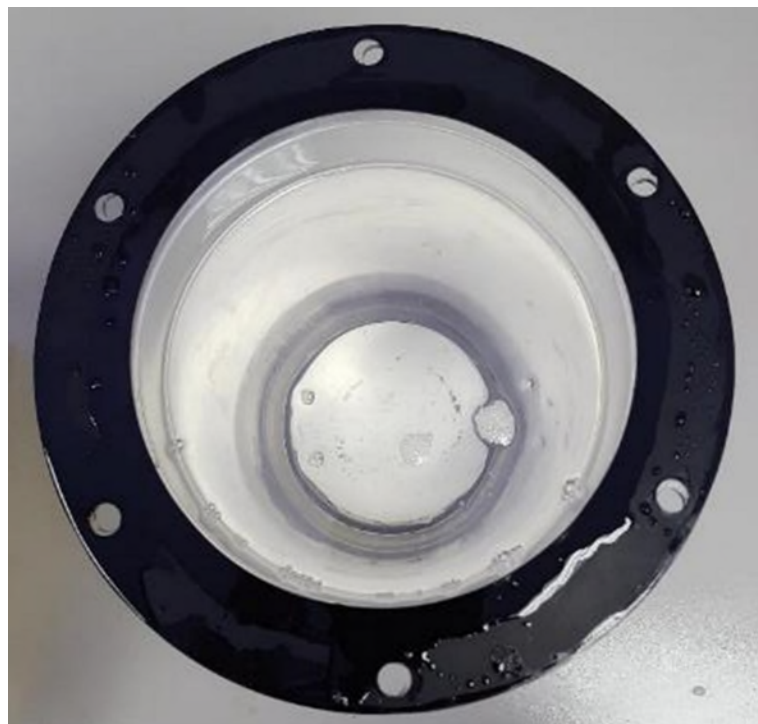


Figure 14: Product IPX8 After Water Test Inspection (Transformer fluid on inside, water droplets around middle) view.



Figure 15: Product IPX8 After Water Test Inspection (Transformer fluid on inside, water droplets around middle) view.

End of Test Report