molex **PRODUCT SPECIFICATION**

SQUBA 3.6 INTERCONNECT

Wire-To-Wire

CONNECTOR SYSTEMS

Receptacle Housing	Plug Housing
	
Series: 207782	Series: 207778

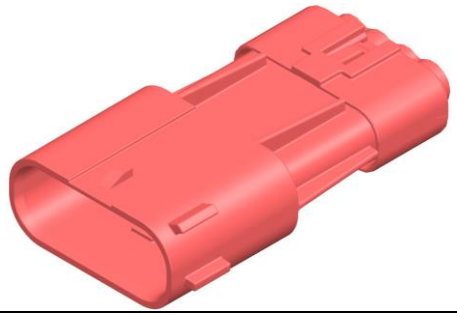
Receptacle Housing with Key/Colors	Plug Housing with Key/colors and Clip slot
	
Series: 207782	Series: 207778

Squba Connectors Web Page | TABLE OF CONTENTS

REVISION:	ECM INFORMATION:	TITLE:	SHEET No.
F4	EC No: 757761 DATE: 23/08/02	PRODUCT SPECIFICATION SQUBA 3.6 INTERCONNECT SYSTEM	1 of 18

DOCUMENT NUMBER:	DOC TYPE:	DOC PART:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
2077760000-PS	PS	000	GOOLAM	GOOLAM	MRAMAKRISHNA

TEMPLATE FILENAME: 1703070003 REV A

Plug Housing with Key/colors

Series: 207778

Receptacle Crimp Terminal	Plug Crimp Terminal
	
Series: 207777	Series: 207776

Receptacle Weather Cap	Plug Weather Cap
	
Series: 220424	Series: 220423

Squba Connectors Web Page | TABLE OF CONTENTS

Table of Contents

ITEMS		PAGE
1.0	SCOPE	4
2.0	PRODUCT DESCRIPTION	4
2.1	DESCRIPTION, SERIES NUMBER, AND LINKS	4
2.2	DIMENSIONS, MATERIALS, PLATINGS	4
2.3	ENVIRONMENTAL CONFORMANCE	4
2.4	SAFETY AGENCY LISTINGS	4
3.0	APPLICABLE DOCUMENTS AND SPECIFICATION	5
3.1	MOLEX DOCUMENTS	5
3.2	INDUSTRY DOCUMENTS	5
4.0	ELECTRICAL PERFORMANCE RATINGS	5
4.1	VOLTAGE	5
4.2	CURRENT AND APPLICABLE WIRES (MAXIMUM AMPERES)	5 7
4.3	VOLTAGE DROP AT RATED CURRENT	8
4.4	TEMPERATURE	8
4.5	DURABILITY	9
4.6	GLOW WIRE SERIES	9
4.7	POTTING COMPATIBILITY	9
5.0	QUALIFICATION	9
6.0	PERFORMANCE	10
6.1	ELECTRICAL PERFORMANCE	10
6.2	MECHANICAL PERFORMANCE	11
6.3	ENVIRONMENTAL PERFORMANCE	12
7.0	TEST SEQUENCE GROUPS	13
8.0	PACKAGING	15
9.0	CABLE TIE AND / OR TWIST TIE LOCATION	15
10.0	POLARIZATION AND KEYING OPTIONS	16

1.0 SCOPE

This Product Specification covers the performance requirements for the Squba 3.6 Sealed Wire-To-Wire, 3.6 mm pitch single row connector series which uses copper terminals with tin plated contact interface terminated with 16 to 20 AWG wire using Molex crimp technology. The mated system meets IP68 requirements.

2.0 PRODUCT DESCRIPTION

2.1 DESCRIPTION, SERIES NUMBER, AND LINKS

DESCRIPTION	SERIES NUMBER
Squba 3.6, Receptacle Crimp Terminal	207777
Squba 3.6, Plug Crimp Terminal	207776
Squba 3.6, Receptacle assembly	207782
Squba 3.6, Receptacle assembly with Key/Colors	
Squba 3.6, Plug assembly	207778
Squba 3.6, Plug assembly with Key/Colors	
Squba 3.6, Plug assembly with Key/Colors and Clip slot	
Squba Plug Weather Cap	220423
Squba Receptacle Weather Cap	220424

2.2 DIMENSIONS, MATERIALS, PLATINGS

Dimensions & Plating: See individual sales drawings.
Plug Crimp Terminal Sales Drawing…… 2077760000-SD
Receptacle Crimp Terminal Sales Drawing…… 2077770000-SD
Plug Assembly Sales Drawing……... 2077780000-SD
Receptacle Assembly Sales Drawing……... 2077820000-SD
Plug Weather Cap Sales Drawing……..……... 2077780000-SD
Receptacle weather Cap Sales Drawing……..……..... 2077820000-SD

2.3 ENVIRONMENTAL CONFORMANCE

To find product compliance information:
a. Go to molex.com
b. Enter the part number in the search field.
c. At the bottom of the page go to “Environmental” to see compliance status.

2.4 SAFETY AGENCY LISTINGS

UL File: E29179, E316343.

3.0 APPLICABLE DOCUMENTS AND SPECIFICATION

3.1 MOLEX DOCUMENTS

Squba 3.6 Interconnect System Test summary 2077760000-TS-000
Squba 3.6 Interconnect System Application summary 2077760000-AS-000
Molex Quality Crimping Handbook Order No. 63800-0029
Molex Moisture Technical Advisory AS-45499-001
Molex Package Handling Specification 454990100-PK
ATS – Application Tooling Specification*

**Application Tooling Specification for terminals is not provided in this document. ATS for terminals can be available from respective terminal part number page in Molex.com*

3.2 INDUSTRY DOCUMENTS

EIA-364-1000
IEC-60529

4.0 ELECTRICAL PERFORMANCE RATINGS

4.1 VOLTAGE

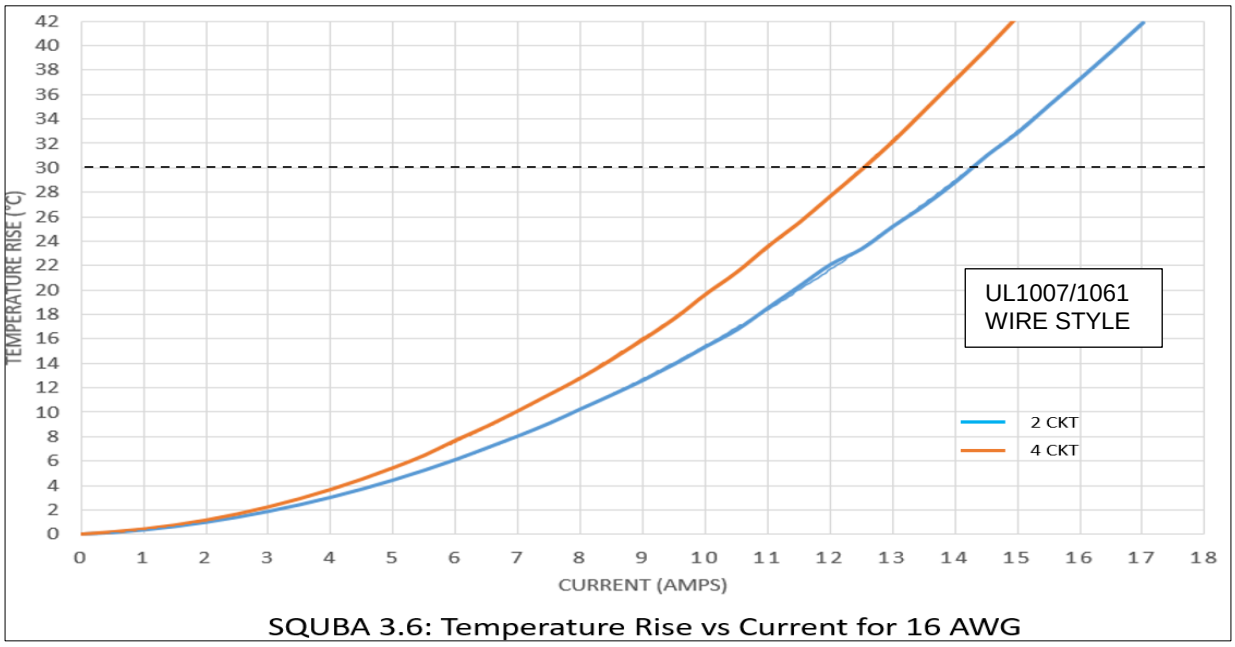
600 Volts AC/DC

4.2 CURRENT AND APPLICABLE WIRES (MAXIMUM AMPERES)

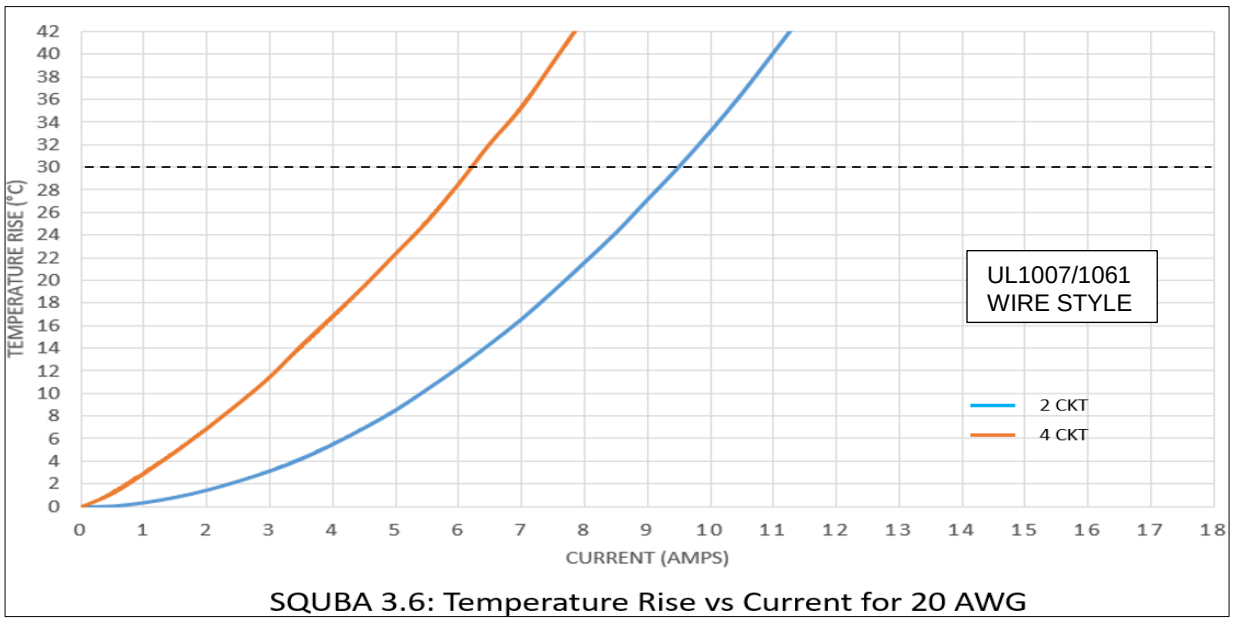
Note: Ratings shown represent *MAXIMUM* current carrying capacity of a fully loaded connector with all circuits powered in air. Ratings are based on a 30°C maximum temperature rise limit over ambient (room temperature). Current is application dependent and below charts are intended as a guideline. Appropriate de-rating is required depending on factors such as higher ambient temperature, gross heating from adjacent modules or components and other factors that influence connector performance.

Wire AWG	Insulation Diameter, mm	Circuit Sizes		
		2	3	4
16	1.90 to 2.40	14.0 A	13.2 A*	12.5 A
18	1.46 to 2.10	11.5 A*	10.3 A*	9.2 A*
20	1.46 to 2.10	9.0 A	7.5 A*	6.0 A
18	2.65 to 2.85	11.5 A	10.2 A*	9.0 A
20	2.50 to 2.65	9.5 A	8.7 A*	8.0 A

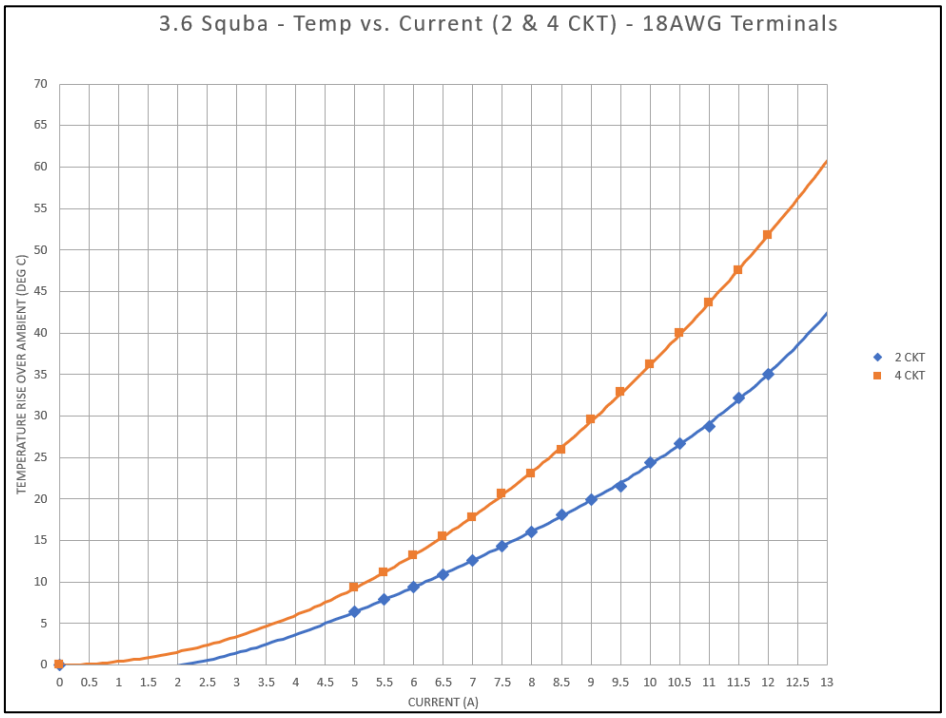
*Interpolated Values



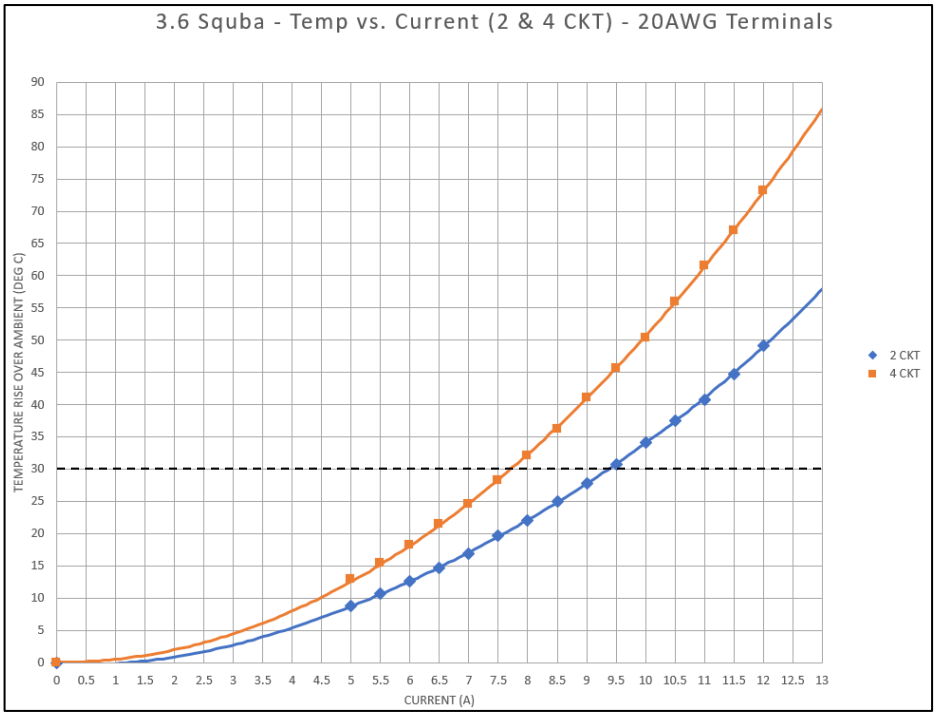
SQUBA 3.6: Temperature Rise vs Current for 16 AWG



SQUBA 3.6: Temperature Rise vs Current for 20 AWG



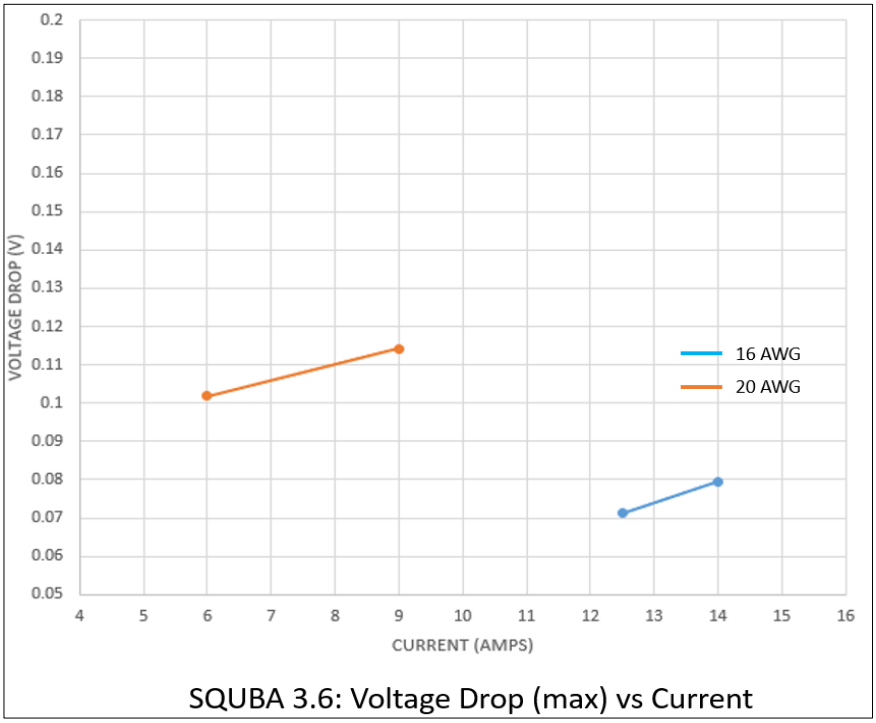
UL1015/1230
WIRE STYLE



UL1015/1230
WIRE STYLE

Squba Connectors Web Page | TABLE OF CONTENTS

4.3 VOLTAGE DROP AT RATED CURRENT



SQUBA 3.6: Voltage Drop (max) vs Current

4.4 TEMPERATURE

Operating Temperature Range (includes T-Rise from applied current): - 40°C to + 105°C
Non-Operating Range: -40°C to + 105°C

Field Temperature and Field Life: 60°C for 10 years (based EIA-364-1000, table 8)

Note: Temperature life test duration (section 6.3. item 1) assumes that the contact spends its entire life at the rated field maximum temperature.
(Based on EIA-364-1000, table 8).

4.5 DURABILITY

Plating Type	Number of Cycles
Tin Plated	25

As tested in accordance with EIA-364-1000 test method (see sec 6.2.4 of this specification). Durability per EIA-364-09

4.6 GLOW WIRE SERIES

The following series are glow capable: 207778, 207782. Representative samples were tested and found compliant with EN 60695-2-11-2001 / IEC 60695-2-11-2000 Glow Wire Test Methods for End-Products. These were additionally investigated for compliance with EN 60335-1 / IEC 60335-1 750°C & 850°C / 2 sec with no flaming.

4.7 POTTING COMPATIBILITY

The product is compatible with 832TC - Thermally Conductive Epoxy for potting applications.

5.0 QUALIFICATION

Laboratory condition, sample selection and test sequences are in accordance with EIA-364-1000.

6.0 PERFORMANCE

6.1 ELECTRICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.1.1	Contact Resistance (Low Level)	Mate connectors: apply a maximum voltage of 20 mV and a current of100 mA. EIA-364-23	10 milliohms MAXIMUM [initial]
6.1.2	Insulation Resistance	Unmate & unmount connectors: apply a voltage of 500 VDC between adjacent terminals and between terminals to ground. EIA-364-21	1000 Megohms MINIMUM
6.1.3	Dielectric Withstanding Voltage	Mate connectors: apply a voltage of 2200 VAC for 1 minute between adjacent terminals and between terminals to ground. EIA-364-20	No breakdown. current leakage < 5 mA
6.1.4	Temperature Rise (Current Profiling)	Mate connectors: measure the temperature rise at the rated current. EIA-364-70, Method 2	Temperature rise: +30°C MAXIMUM [Over ambient] See table under section 4.2
6.1.5	Temperature Rise (Via Current Cycling)	Mate connectors: measure the temperature rise at the rated current after: 96 hours (steady state) 240 hours (45 minutes ON and 15 minutes OFF per hour) 96 hours (steady state) Steady state per EIA-364-70, Method 2. Current cycling per EIA-364-55, Test Condition A, Test Method 4	Temperature rise: +30°C MAXIMUM [Over ambient]
6.1.6	Contact Resistance @ rated current	Mate Connectors: Apply a maximum voltage of 20mV at rated current. Wire resistance shall be removed from the measured value	10 milliohms Max (Initial)

6.1.7	Contact Resistance of wire termination	Terminate the applicable wire to the and measure wire using a voltage of 20mV and a current of 100mA	10 milliohms Max (Initial)

6.2 MECHANICAL PERFORMANCE

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.2.1	Connector Mate and Unmate Forces	Mate and unmate connector (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	50 N (11.24 lbf) Maximum mate force & 10 N (2.25 lbf) MINIMUM unmate force
6.2.2	Terminal Retention Force (In Housing)	Axial pullout force on the terminal in the housing at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	40 N (8.99 lbf) MINIMUM retention force
6.2.3	Terminal Insertion Force (Into Housing)	Apply an axial insertion force on the terminal at a rate of 25 ± 6 mm (1 ± ¼ inch).	15.0 N (3.37 lbf) MAXIMUM insertion force
6.2.4	Durability	Mate connectors up to 25 cycles at a maximum rate of 10 cycles per minute. EIA-364-09	20 milliohms MAXIMUM (Change from initial)
6.2.5	Vibration (Random) Shock (Mechanical) EIA-364-1000 Test Group 3 (See section 7.0)	Mate connectors and vibrate per EIA 364-28, test condition VII, Letter D. Test Duration: 15 minutes each axis. Mate connectors and shock at 50 g's with ½ sine wave (11 milliseconds) shocks in the ±X, ±Y, ±Z axes (18 shocks total). EIA-364-27, Test Condition H	20 milliohms MAXIMUM (Change from initial) & Discontinuity < 1 microsecond
6.2.6	Wire Pullout Force (Axial)	Apply an axial pullout force on the wire at a rate of 25 ± 6 mm (1 ± ¼ inch).	16 AWG = 88 N (19.8 lbf) 18 AWG = 88 N (19.8 lbf) 20 AWG = 36 N (8.09 lbf) MINIMUM pullout force according to UL1977

6.2.7	Connector Un-mate Force w/o Thumb Latch Locked (destructive)	Mate loaded connectors fully. Pull connectors apart at a rate of 25 ± 6mm (1 ± ¼ inch) per minute.	80 N (17.98 lbf) MINIMUM retention force
6.2.8	Normal Force	Apply a perpendicular force	3.58 N MAX
6.2.9	Plug weather Cap Mate/Unmate	Insert and withdraw (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	Mate: 75N Max Unmate: 4N Min
6.2.10	Receptacle Weather Cap Mate/Unmate	Insert and withdraw (male to female) at a rate of 25 ± 6 mm (1 ± ¼ inch) per minute.	Mate: 35N Max Unmate: 50N Min
6.2.11	Vibration (Weather cap)	Per EIA-364-28 test condition VII-G Mate connectors halves to respective Caps and vibrate for 15 minutes each axis.	Weather Cap should not unmate
6.2.12	Clip Engage and Disengage Force	Per SAE/USCAR-2 Rev 6 section 5.4.5	60N Max Insertion, 110N Min Disengage
6.2.13	Connector Mounting Feature Mechanical Strength	Per SAE/USCAR-2 Rev 6 Section 5.4.11	50N Min F1 to F5, 110N Min F6
6.2.14	Polarization Feature Effectiveness	Mate connector halves with wrong polarization (Male to female) at a rate of 10 mm/Min	50 N (11.24 lbf) Minimum mate force

6.3 ENVIRONMENTAL PERFORMANCE

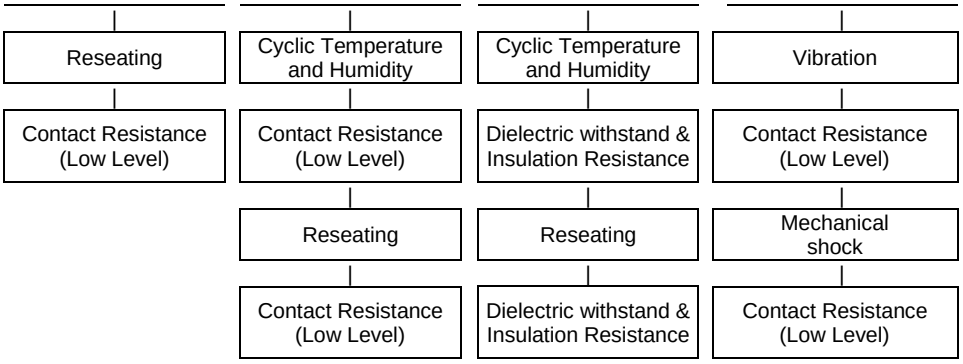
ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.3.1	Temperature life EIA-364-1000 Test group 1 (See section 7.0)	Mate connectors; expose to: 240 hours at 105 ± 2°C. EIA-364-17, Method A	20 milliohms MAXIMUM (Change from initial) & Visual: No Damage

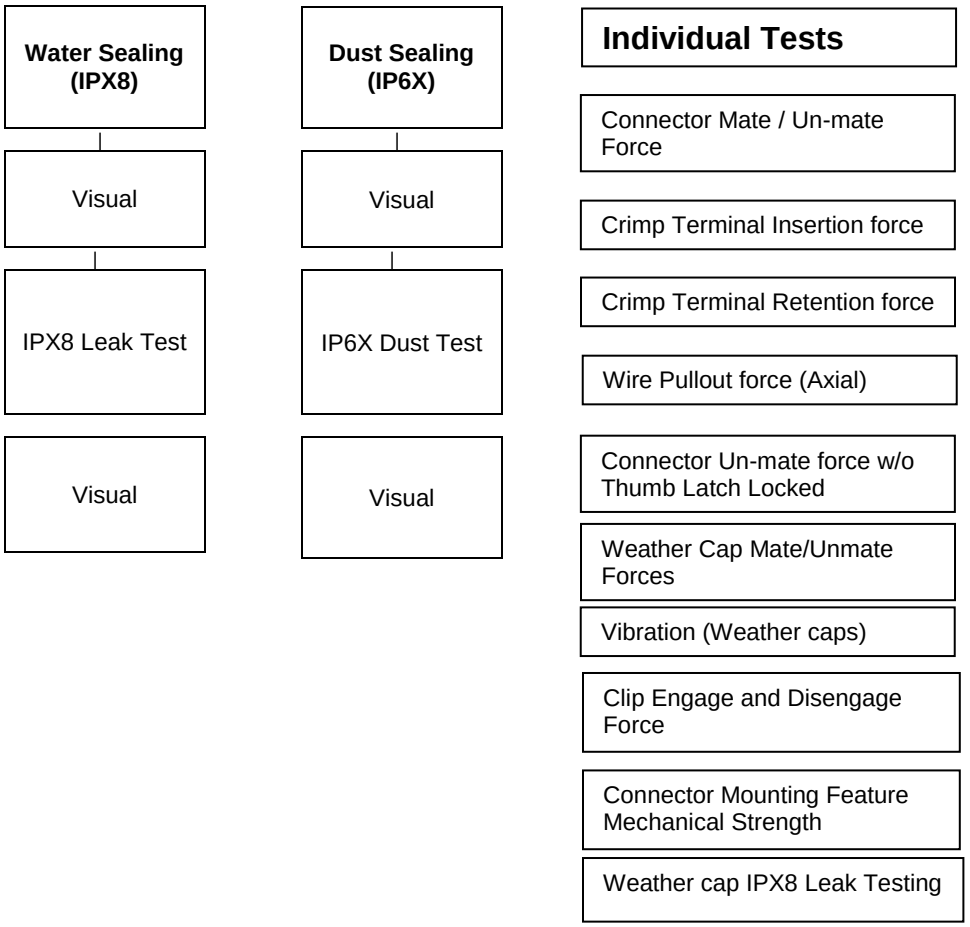
6.3.2	Shock (Thermal) EIA-364-1000 Test group 2A & 2B (See section 7.0)	Mate connectors; expose to 5 cycles of: Temperature °C — Duration (Minutes) -40 +0/-3 — 30 +25 ±10 — 5 MAXIMUM +105 +3/-0 — 30 +25 ±10 — 5 MAXIMUM EIA-364-32, Test Condition VIII	20 milliohms MAXIMUM (Change from initial) & Visual: No Damage
6.3.3	IPX8 Continuous Water Immersion	IEC 60529, Ed. 2.1. Mate connectors/ weather caps and immerse in water at a depth of 1.5 meter from the water surface for 30 minutes.	No signs of water indicating ingress inside the connector system
6.3.4	IP6X Dust Exposure	IEC 60529, Ed. 2.1, Connectors: Category 1 Enclosure,8-hour duration. Weather Caps: Category 2 Enclosure,8-hour duration.	No deposit of dust indicating ingress inside the connector system
6.3.5	Cyclic Temperature & Humidity EIA-364-1000 Test group 2A & 2B (See section 7.0)	Mate connectors: cycle per EIA-364-31: 24 cycles at temperature 25 ± 3°C at 80 ± 5% relative humidity and 65 ± 3°C at 50 ± 5% relative humidity; dwell time of 1.0 hour; ramp time of 0.5 hours.	20 milliohms MAXIMUM (Change from initial) & Dielectric Withstanding Voltage: No Breakdown at 500 VAC & Insulation Resistance: 1000 Megohms MINIMUM & Visual: No Damage

7.0 TEST SEQUENCE GROUPS

Reliability Test Sequences per EIA-364-1000

Group I	Group II A	Group II B	Group III
Contact Resistance (Low Level)	Contact Resistance (Low Level)	Dielectric withstand & Insulation Resistance	Contact Resistance (Low Level)
Durability (Preconditioning)	Durability (Preconditioning)	Durability (Preconditioning)	Durability (Preconditioning)
Temperature Life 105° C for 240 hours	Thermal Shock	Thermal Shock	Temperature Life (Preconditioning)
Contact Resistance (Low Level)	Contact Resistance (Low Level)	Dielectric withstand & Insulation Resistance	Contact Resistance (Low Level)





Squba Connectors Web Page | TABLE OF CONTENTS

Weather cap IP6X Dust Testing

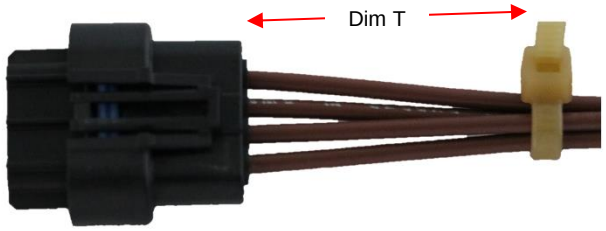
8.0 PACKAGING

Parts shall be packaging to protect the parts from damage during standard shipping, storage, and handling.

Plug Crimp Terminal Packaging Specification……2077760000-PK.
Receptacle Crimp Terminal Packaging Specification……2077770000-PK.
Plug Assembly Packaging Specification……..2077780000-PK.
Receptacle Assembly Packaging Specification……..2077820000-PK.

9.0 CABLE TIE AND / OR TWIST TIE LOCATION

CKT Size	Dim T Min.
2	50.8 mm (2.00”)
3	50.8 mm (2.00”)
4	76.2 mm (3.00”)

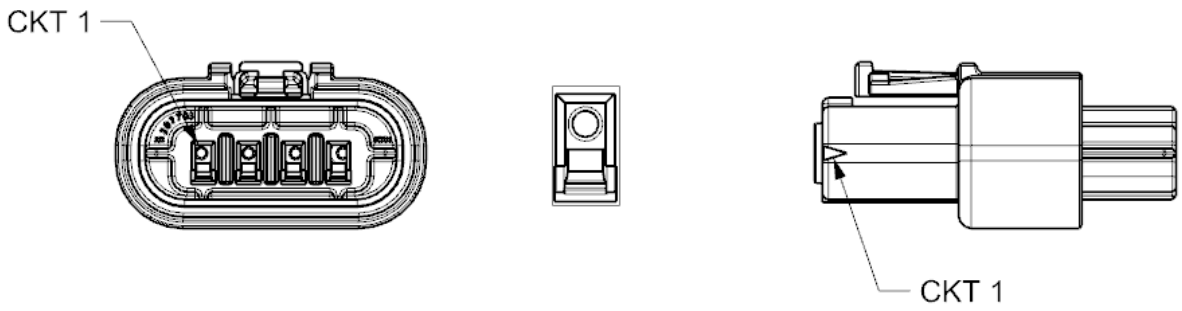


The “T” dimension defines a “free” length of wire, or a length of wire that is not subject to significant bias by external factors such as a wire tie, wire twisting, or other means of bending or deforming of the wires that repositions them from their natural relaxed state or location where they enter the housing. Wires are to be dressed in such a manner to allow the terminals to float freely in the pocket. This dimension is

general recommendation and may need to be adjusted for different wire gauges and wire type and insulation thickness and insulation material.

10.0 POLARIZATION AND KEYING OPTIONS

10.1 Receptacle Assembly (Series: 207782)

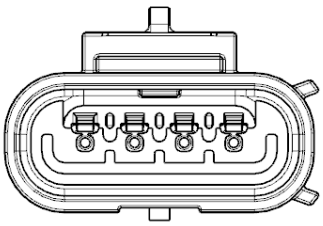


10.2 Plug Assembly (Series: 207778)

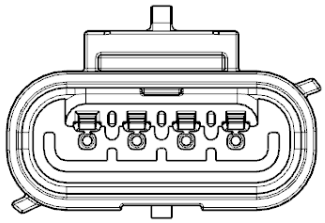


Plug Key Configurations

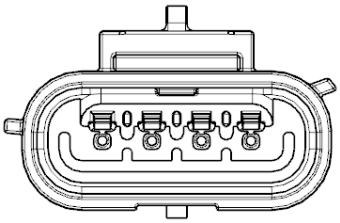
KEY A, RED COLOR



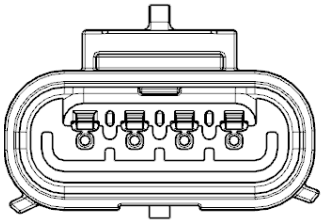
KEY B, NATURAL COLOR



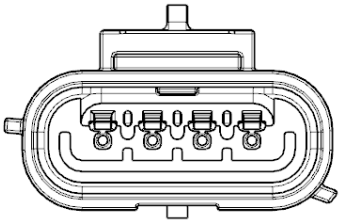
KEY C, GRAY COLOR



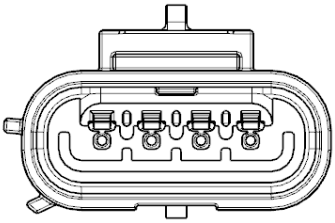
KEY D, YELLOW COLOR



KEY E, BROWN COLOR



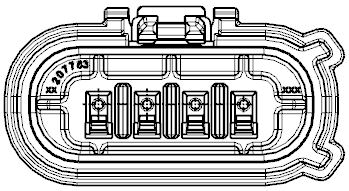
KEY F, ORANGE COLOR



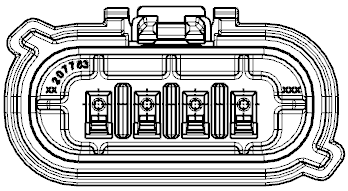
Receptacle Key Configurations

molex PRODUCT SPECIFICATION

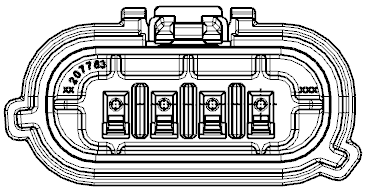
KEY A, RED COLOR



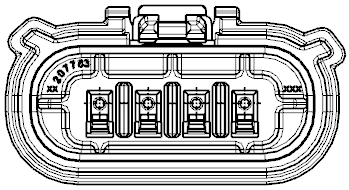
KEY B, NATURAL COLOR



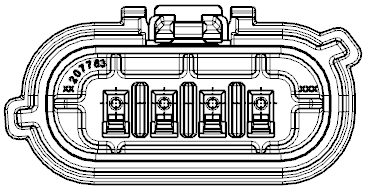
KEY C, GRAY COLOR



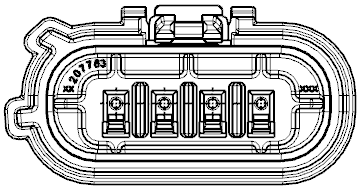
KEY D, YELLOW COLOR



KEY E, BROWN COLOR



KEY F, ORANGE COLOR



Squba Connectors Web Page | TABLE OF CONTENTS

REVISION:	ECM INFORMATION:	TITLE:	SHEET No.
F4	EC No: 757761 DATE: 23/08/02	PRODUCT SPECIFICATION SQUBA 3.6 INTERCONNECT SYSTEM	18 of 18

DOCUMENT NUMBER:	DOC TYPE:	DOC PART:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
2077760000-PS	PS	000	GOOLAM	GOOLAM	MRAMAKRISHNA