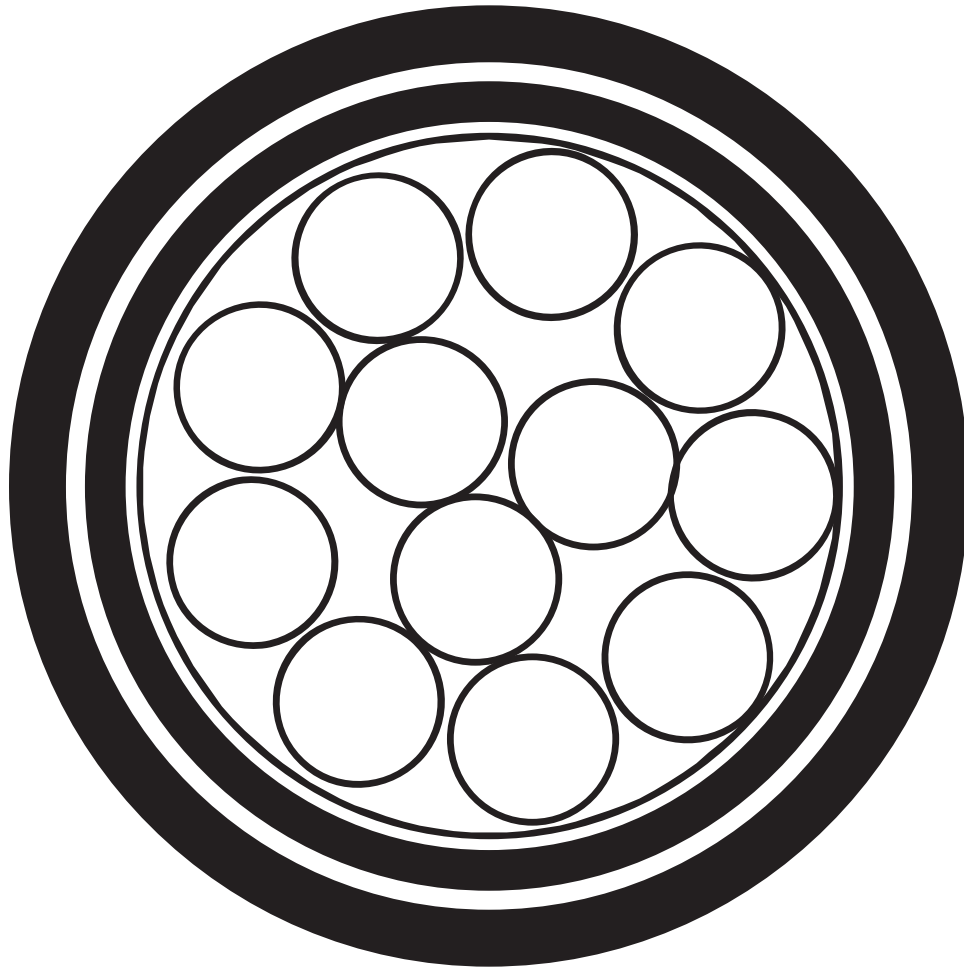


catalog | **Copper  
Wires**





**Description**

Multi-pair, self-supporting Aerial Service Wires (ASW) are used for subscriber lines in exchange plant; single-pair is often used for lateral runs from aerial plant. In both single and multi-pair types, the wire core is laid parallel to a solid steel support wire and jacketed in an integral extrusion to form a "figure-8" configuration utilizing a 0.109" solid, extra-high strength steel support member.

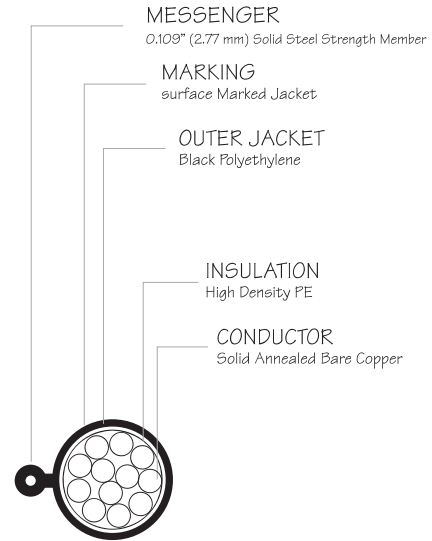
**Conductors:** Solid annealed copper in 19, 22 and 24 AWG.

**Insulation:** Each conductor is insulated with solid high-density color coded polyethylene resulting in excellent electrical and mechanical properties. Standard color codes are used for pair identification with color compounds chosen for electrical balance and permanency.

**Assembly:** Individual conductors are carefully twisted into pairs in a manner designed to minimize resistance unbalance. In multi-pair constructions, pair twist lays are varied to minimize crosstalk and meet capacitance unbalance requirements. Twisted pairs are formed into a firm, round core.

**Outer Jacket:** A black, high-molecular weight, polyethylene provides a tough, flexible protective covering that withstands exposure to sunlight, atmospheric temperatures and stresses encountered in standard installations. The steel support wire is jacketed in an integral extrusion with the core.

**Cable cut-away**



**Applications**

4SProducts multi-pair ASWire® cables are used for subscriber lines in exchange plant. The single-pair is often used for lateral runs from aerial plant.

**Qualifications & Approvals**

Manufactured to meet requirements for Hard Drawn Copper Wire ASTM B3.

**Electrical Specifications**

Average Mutual Capacitance @ 1000 Hz											
		nf/mile		nf/km							
Maximum Individual		94		58							
Wire Average		83 ± 7		52 ± 4							
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		Maximum		Minimum	
AWG	mm	gigohm/mile	gigohm/km	dB/kft	dB/km	ohms/mile	ohms/km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Sprt. Wire
19	0.90	1.0	1.6	3.6	11.8	45.0	28.0	1.1	5.0	5,000	7,200
22	0.64	1.0	1.6	5.1	16.7	91.0	56.4	1.1	5.0	4,000	7,200
24	0.50	1.0	1.6	6.5	21.3	144.0	89.5	1.1	5.0	3,000	7,200

Crosstalk Loss		dB/kft		dB/km		Capacitance Unbalance @1000 Hz		pF/kft		pF/km	
Min. FEXT @ 150 kHz		63		58		Max. Pair-to-Pair		80		145	
Min. NEXT @ 722 kHz		44 (dB)				Max. Pair-to-Support Wire		800		2,625	



**Description**

4SProducts BSWire® is filled, double-jacketed wire designed for direct burial applications and available in 2, 3, and 6 pair sizes. The primary application of a Buried Service Wire is service entrances and distribution circuits. It is filled with PIB base jelly compound, which is chemically and electrically compatible with all other materials in the wire. The compound completely coats each insulated conductor and fills the air space between conductors.

**Conductors:** Solid annealed copper in 19, 22 and 24 AWG.

**Insulation:** Each conductor is insulated with solid high-density polyethylene in distinctive colors.

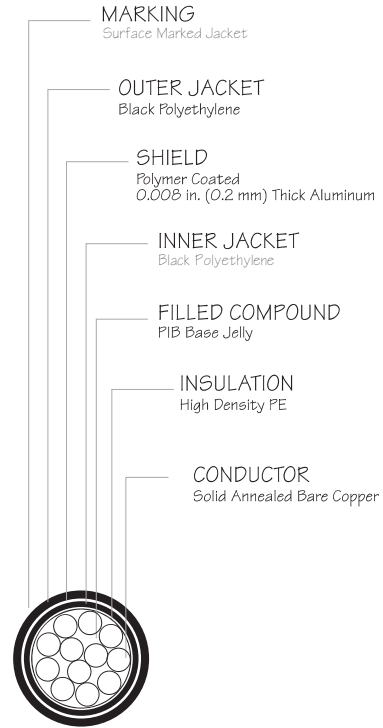
**Core Assembly:** Individual conductor dimensions are tightly controlled to limit resistance unbalance of twisted pairs. Pair twist lays are varied to minimize crosstalk and meet capacitance unbalance limits. The wire core is completely filled with PIB base jelly such as BP Naptel 867, filling the air spaces between insulated conductors.

**Inner Jacket:** A black, linear low-density polyethylene inner jacket provides additional mechanical and moisture protection.

**Shield:** A smooth, copolymer-coated, 8 mil aluminum tape is applied longitudinally over the inner jacket and is bonded to the outer jacket. The space under the tape is flooded to eliminate all air space.

**Outer Jacket:** A black, linear low-density polyethylene outer jacket provides a tough, flexible, protective covering that withstands exposure to sunlight, atmospheric temperatures, ground chemicals and stresses expected in standard installation.

**Cable cut-away**



**Qualifications & Approvals**

Manufactured to meet requirements of ANSI/CEA S-86-634-1996.

**Electrical Specifications**

Average Mutual Capacitance @ 1000 Hz											
		nf/mile		nf/km							
Maximum Individual		94		58							
Wire Average		83 ± 7		52 ± 4							
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		Maximum		Minimum	
AWG	mm	gigohm/mile	gigohm/km	dB/kft	dB/km	ohms/mile	ohms/km	Individual pair %	Cdr to Cdr	Cdr to Sprt. Wire	
19	0.90	1.0	1.6	3.2	10.0	45.0	28.0	5.0	7,000	20,000	
22	0.64	1.0	1.6	4.6	15.1	91.0	56.4	5.0	5,000	20,000	
24	0.50	1.0	1.6	5.8	19.0	144.0	89.5	5.0	4,000	20,000	
Crosstalk Loss				dB/kft		dB/km		Capacitance Unbalance @1000 Hz		pF/kft	
Min. FEXT @ 150 kHz				63		58		Max. Pair-to-Pair		80	
Min. NEXT @ 722 KHz				44 (dB)				Max. Pair-to-Ground		800	
										145	
										2,625	



### Description

4SProducts BSWire® is filled, double-jacketed wire designed for direct burial applications and available in 2, 3, and 6 pair sizes. The primary application of a Buried Service Wire is service entrances and distribution circuits. It is filled with PIB base jelly compound, which is chemically and electrically compatible with all other materials in the wire. The compound completely coats each insulated conductor and fills the air space between conductors.

**Conductors:** Solid annealed copper in 19, 22 and 24 AWG.

**Insulation:** Each conductor is insulated with solid high-density polyethylene in distinctive colors.

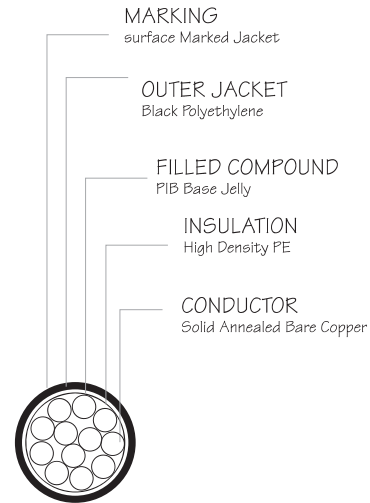
**Core Assembly:** Individual conductor dimensions are tightly controlled to limit resistance unbalance of twisted pairs. Pair twist lays are varied to minimize crosstalk and meet capacitance unbalance limits. The wire core is completely filled with PIB base jelly such as BP Naptel 867, filling the air spaces between insulated conductors.

**Inner Jacket:** A black, linear low-density polyethylene inner jacket provides additional mechanical and moisture protection.

**Shield:** A smooth, copolymer-coated, 8 mil aluminum tape is applied longitudinally over the inner jacket and is bonded to the outer jacket. The space under the tape is flooded to eliminate all air space.

**Outer Jacket:** A black, linear low-density polyethylene outer jacket provides a tough, flexible, protective covering that withstands exposure to sunlight, atmospheric temperatures, ground chemicals and stresses expected in standard installation.

### Cable cut-away



### Electrical Specifications

Minimum Mutual Capacitance @ 1000 Hz									
		nf/mile		nf/km					
Maximum Individual		94		58					
Wire Average		83 ± 7		52 ± 4					
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Resistance Unbalance	Dielectric Strength DC Potential Volts
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		Maximum	Minimum
AWG	mm	gigohm/mile	gigohm/km	dB/kft	dB/km	ohms/mile	ohms/km	Individual pair %	Cdr to Cdr
22	0.64	1.0	1.6	4.6	15.1	91.0	56.4	5.0	5,000
24	0.50	1.0	1.6	5.8	19.0	144.0	89.5	5.0	4,000
Crosstalk Loss				dB/kft	dB/km	Capacitance Unbalance @1000 Hz		pF/kft	pF/km
Min. FEEXT @ 150 kHz				63	58	Max. Pair-to-Pair		80	145
Min. NEXXT @ 722 kHz				44 (dB)		Max. Pair-to-Ground		800	2,625

## Technical Data Sheet

Aerial Drop Wire | Copper Conductor | Single-pair

Pair Count 1P

Outside Plant Copper Cable - Exchange Cable

### Description

Single-pair, vinyl-insulated aerial drop wire designed for use in extending telephone circuits to subscriber premises by means of an aerial drop from distribution wire or cable.

**Conductors:** Two round hard drawn wire copper conductors in diameter of 0.8, 0.9 and 1.0 mm ASTM B3.

**Insulation:** Conductors are laid in a parallel configuration and covered with flame and abrasion resistant, all-weather black polyethylene compound that serves as both insulation and jacket. One raised ridge tracer on one edge of the jacket provides conductor polarity identification.

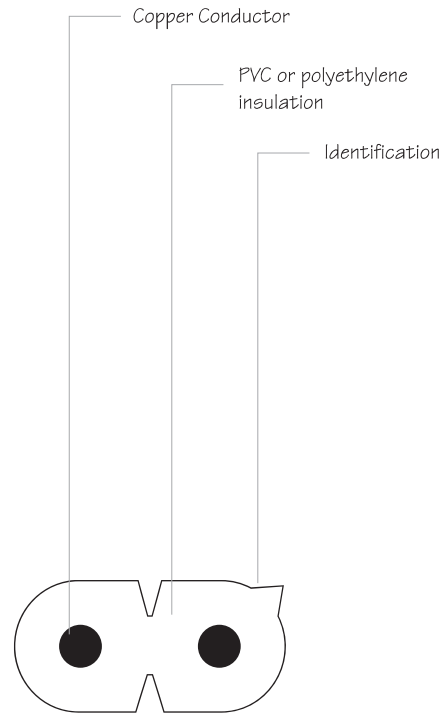
### Applications

4SProducts DCWire®-10 cables are used for extending an open wire line and/or distribution cable pair from a pole and/or cable terminal to a building.

### Qualifications & Approvals

Manufactured to meet requirements for Hard Drawn Copper Wire ASTM B3.

### Cable cut-away



### Electrical Specifications

Average Mutual Capacitance @ 1000 Hz - tested in water							
Total No. of Pairs		nF/kft		nF/km			
1 Pair		40		130			
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance	Dielectric Strength
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)	3 minutes- no breakdown at
AWG	mm	megohm/mile	megohm/km	DB/kft	dB/km	ohms/km	Volts AC
18	1.0	100	30	4	13.1	23.39	4,000

### Physical Data & Standard Packaging

Minor Dimension		Major Dimension		Conductor Spacing		Standard Packaging		Approximate Shipping Weight	
in	mm	in	mm	in	mm	ft	m	lbs/kft	kg/km
0.12	3.0	2.5	6.3	0.13	3.3	1,640	500	29.5	39.0

## Technical Data Sheet

Aerial Drop Wire | Copper Clad Steel Conductor | Single-pair

Pair Count 1P

Outside Plant Copper Cable - Exchange Cable

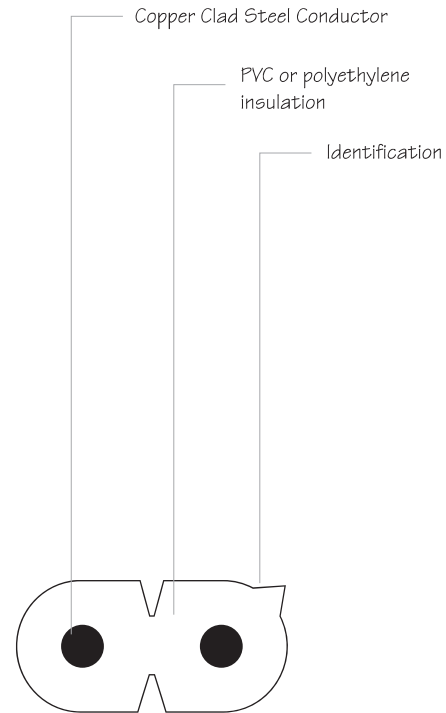
### Description

Single-pair, vinyl-insulated aerial drop wire designed for use in extending telephone circuits to subscriber premises by means of an aerial drop from distribution wire or cable.

**Conductors:** Two round 18.0 AWG solid 30% conductivity extra high strength copper/steel wires serve dually as conductors and strength members. Optimized tensile breaking strength and elongation assure superior toughness against ice loading and impact from falling ice-coated tree limbs and other mechanical shocks.

**Insulation:** Conductors are laid in a parallel configuration and covered with flame and abrasion resistant, all-weather black polyvinyl chloride compound that serves as both insulation and jacket. One raised ridge tracer on one edge of the jacket provides conductor polarity identification.

### Cable cut-away



### Applications

4SProducts DSWire®-10 cables are designed for extending an open wire line or distribution cable pair from a pole and/or cable terminal to a building.

### Qualifications & Approvals

Manufactured to meet requirements of ASTM B-227; BS-6004.

### Electrical Specifications

Average Mutual Capacitance @ 1000 Hz - tested in water									
Total No. of Pairs		nF/kft		nF/km					
1 Pair		40		130					
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Dielectric Strength	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		3 seconds - no breakdown at Volts DC	
AWG	mm	megohm/mile	megohm/km	DB/kft	dB/km	ohms/kft	ohms/km	Dry	in Water
18	1.0	100	30	4	13.1	24.5	80.4	12,100	7,050

### Physical Data & Standard Packaging

Minor Dimension		Major Dimension		Conductor Spacing		Standard Packaging		Approximate Shipping Weight	
in	mm	in	mm	in	mm	ft	m	lbs/kft	kg/km
0.12	3.0	0.25	6.3	0.13	3.3	1000	305	29	43.2

## Technical Data Sheet

Aerial Drop Wire | Copper Clad Steel Conductor | Single-pair

Pair Count 1P

Outside Plant Copper Cable - Exchange Cable

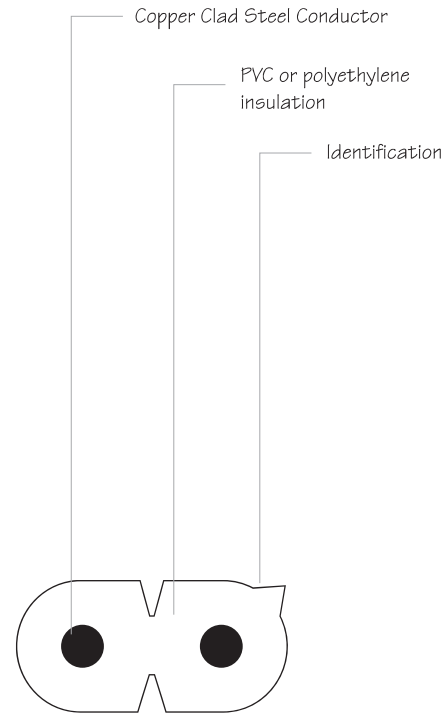
### Description

Single-pair, vinyl-insulated aerial drop wire designed for use in extending telephone circuits to subscriber premises by means of an aerial drop from distribution wire or cable.

**Conductors:** Two round 18.0 AWG solid 30% conductivity extra high strength copper/steel wires serve dually as conductors and strength members. Optimized tensile breaking strength and elongation assure superior toughness against ice loading and impact from falling ice-coated tree limbs and other mechanical shocks.

**Insulation:** Conductors are laid in a parallel configuration and covered with flame and abrasion resistant, all-weather black polyvinyl chloride compound that serves as both insulation and jacket. One raised ridge tracer on one edge of the jacket provides conductor polarity identification.

### Cable cut-away



### Applications

4SProducts DSWire®-12 cables are designed for extending an open wire line or distribution cable pair from a pole and/or cable terminal to a building.

### Qualifications & Approvals

Manufactured to meet requirements of AEA PE-7; ASTM B-227; BS-6004.

### Electrical Specifications

Average Mutual Capacitance @ 1000 Hz - tested in water									
Total No. of Pairs		nF/kft		nF/km					
1 Pair		40		130					
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Dielectric Strength	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		3 seconds - no breakdown at Volts DC	
AWG	mm	megohm/mile	megohm/km	DB/kft	dB/km	ohms/kft	ohms/km	Dry	in Water
18	1.0	100	30	4	13.1	24.5	80.4	12,100	7,050

### Physical Data & Standard Packaging

Minor Dimension		Major Dimension		Conductor Spacing		Standard Packaging		Approximate Shipping Weight	
in	mm	in	mm	in	mm	ft	m	lbs/kft	kg/km
0.13	3.4	0.28	7.1	0.15	3.7	1000	305	29	43.2

## Technical Data Sheet

Aerial Drop Wire | Copper Clad Steel Conductor | Single-pair

Pair Count 1P

Outside Plant Copper Cable - Exchange Cable

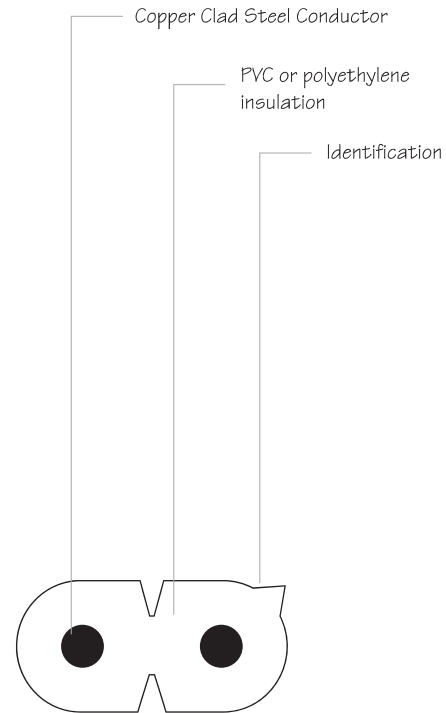
### Description

Single-pair, vinyl-insulated aerial drop wire designed for use in extending telephone circuits to subscriber premises by means of an aerial drop from distribution wire or cable.

**Conductors:** Two round 18.0 AWG solid 30% conductivity extra high strength copper/steel wires serve dually as conductors and strength members. Optimized tensile breaking strength and elongation assure superior toughness against ice loading and impact from falling ice-coated tree limbs and other mechanical shocks.

**Insulation:** Conductors are laid in a parallel configuration and covered with flame and abrasion resistant, all-weather black polyvinyl chloride compound that serves as both insulation and jacket. One raised ridge tracer on one edge of the jacket provides conductor polarity identification.

### Cable cut-away



### Applications

4SProducts DSWire®-14 cables are designed for extending an open wire line or distribution cable pair from a pole and/or cable terminal to a building.

### Qualifications & Approvals

Manufactured to meet requirements of AEA PE-7; ASTM B-227; BS-6004.

### Electrical Specifications

Average Mutual Capacitance @ 1000 Hz - tested in water									
Total No. of Pairs		nF/kft		nF/km					
1 Pair		40		130					
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Dielectric Strength	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		3 seconds - no breakdown at Volts DC	
AWG	mm	megohm/mile	megohm/km	DB/kft	dB/km	ohms/kft	ohms/km	Dry	in Water
18	1.0	100	30	4	13.1	24.5	80.4	12,100	7,050

### Physical Data & Standard Packaging

Minor Dimension		Major Dimension		Conductor Spacing		Standard Packaging		Approximate Shipping Weight	
in	mm	in	mm	in	mm	ft	m	lbs/kft	kg/km
0.15	3.8	0.31	7.8	0.16	4.0	1000	305	29.5	43.9

## Technical Data Sheet

Aerial Drop Wire | Copper Clad Steel Conductor | Single-pair

Pair Count 1P

Outside Plant Copper Cable - Exchange Cable

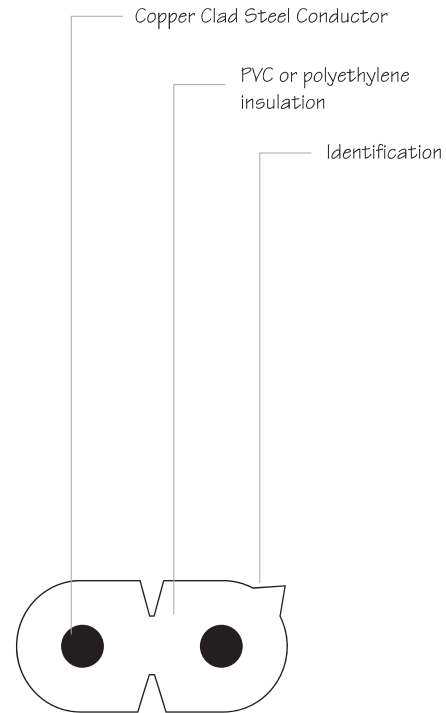
### Description

Single-pair, vinyl-insulated aerial drop wire designed for use in extending telephone circuits to subscriber premises by means of an aerial drop from distribution wire or cable.

**Conductors:** Two round 18.0 AWG solid 30% conductivity extra high strength copper/steel wires serve dually as conductors and strength members. Optimized tensile breaking strength and elongation assure superior toughness against ice loading and impact from falling ice-coated tree limbs and other mechanical shocks.

**Insulation:** Conductors are laid in a parallel configuration and covered with flame and abrasion resistant, all-weather black polyvinyl chloride compound that serves as both insulation and jacket. One raised ridge tracer on one edge of the jacket provides conductor polarity identification.

### Cable cut-away



### Applications

4SProducts DSWire®-15 cables are designed for extending an open wire line or distribution cable pair from a pole and/or cable terminal to a building.

### Qualifications & Approvals

Manufactured to meet requirements of AEA PE-7; ASTM B-227; BS-6004 and ANSI/CEA S-89-648-1993.

### Electrical Specifications

Average Mutual Capacitance @ 1000 Hz - tested in water									
Total No. of Pairs		nF/kft		nF/km					
1 Pair		40		130					
Conductor Size		Minimum Insulation Resistance		Maximum Individual Attenuation		Maximum Individual Conductor DC Resistance		Dielectric Strength	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C)		3 seconds - no breakdown at Volts DC	
AWG	mm	megohm/mile	megohm/km	dB/kft	dB/km	ohms/kft	ohms/km	Dry	in Water
18	1.0	100	30	4	13.1	24.5	80.4	12,100	7,050

### Physical Data & Standard Packaging

Minor Dimension		Major Dimension		Conductor Spacing		Standard Packaging		Approximate Shipping Weight	
in	mm	in	mm	in	mm	ft	m	lbs/kft	kg/km
0.15	3.9	0.31	7.8	0.16	4.0	1000	305	31.0	46.0



### International Shipping & Packaging

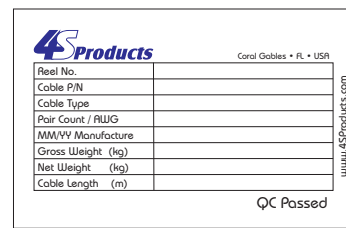
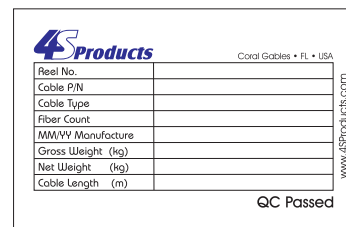
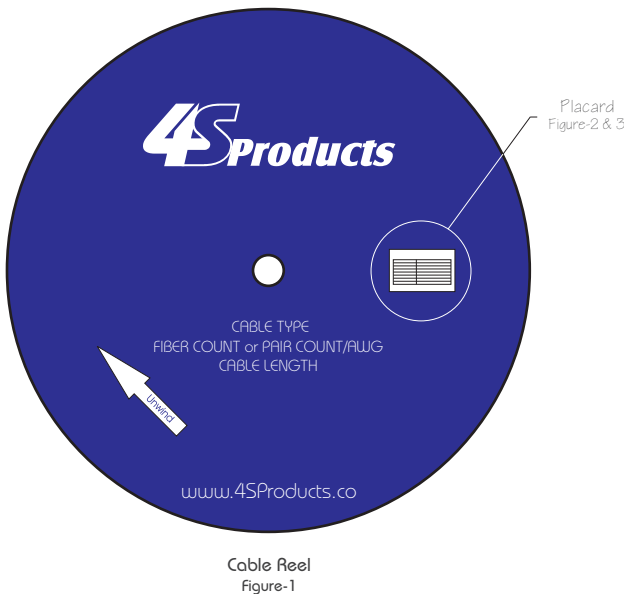
Cable is supplied in lengths specified at the time of purchase. Each length will be shipped on a separate non-returnable wooden reel. The minimum barrel diameter of the reel will not be less than 30 times the cable diameter.

The cable on each reel will be completely covered with a wrap which is fastened to the cable by straps. This wrap provides excellent moisture protection to cables sitting in reel yards.

The cable ends will be sealed with plastic protection caps to prevent water penetration and the escape of water blocking gel (when applicable). The ends will be easily accessible for testing. Optional pulling grips may be factory installed if specified at the time of purchase.

REEL DIMENSIONS (approximate)					
REEL TYPE	REEL CODE	FLANGE DIAMETER	REEL WIDTH	REEL WEIGHT	
Wood	L-3	850 mm (34 in.)	580 mm (23 in.)	32 Kg (70 lbs)	
	L-8	1050 mm (41 in.)	760 mm (30 in.)	61 Kg (134 lbs)	
	L-11	1250 mm (49 in.)	760 mm (30 in.)	91 Kg (200 lbs)	
	L-15	1350 mm (53 in.)	910 mm (36 in.)	106 Kg (233 lbs)	
	L-18	1500 mm (59 in.)	910 mm (36 in.)	133 Kg (293 lbs)	
	L-21	1600 mm (63 in.)	1050 mm (42 in.)	214 Kg (471 lbs)	
	L-25	1800 mm (71 in.)	1050 mm (42 in.)	246 Kg (541 lbs)	
	L-27	1850 mm (73 in.)	1120 mm (44 in.)	294 Kg (647 lbs)	
	L-29	1950 mm (77 in.)	1120 mm (44 in.)	307 Kg (676 lbs)	
	L-37	2210 mm (87 in.)	1240 mm (49 in.)	421 Kg (927 lbs)	
	L-46	2440 mm (96 in.)	1240 mm (49 in.)	504 Kg (1108 lbs)	

Each reel is marked with 4SProducts logo, cable type, fiber count or pair count / AWG, and cable length. A final inspection test report with attenuation performance data for each fiber is submitted via electronic mail, and each reel will have an identification placard detailing information per Figure 2.



#### 1. ACCEPTANCE, WAIVER, MODIFICATION, INTERPRETATION AND CONSTRUCTION

Orders which are accepted, and contracts that are formed, are accepted or formed at Seller's offices on the basis of and strictly limited to the Seller's standard terms and conditions of sale, which Buyer is deemed to consent to as a condition thereto and which shall control over any contrary or additional terms and conditions on any purchase order or other document of Buyer, which additional terms and conditions are hereby objected to and to which Seller shall not be bound. Waiver of any term or condition of sale shall not constitute waiver of any other term or condition or legal remedy of Seller. Any act by Buyer of confirmation of any transaction contemplated hereby, including any order issued in response to a quote of Seller, shall constitute Buyer's acceptance of Seller's terms and conditions. No modification of any order or contract shall be binding unless in writing signed by both parties hereto. Orders and contracts shall be interpreted in accordance with, and the construction hereof shall be governed by, the laws of the State of Florida, United States of America. Captions as used herein are for convenience or reference only and shall not be deemed or construed as in any way limiting or extending the meaning of any terms and conditions.

#### 2. TITLE, DELIVERY, RISK OF LOSS AND SHIPPING

Title to and risk of loss of all goods sold hereunder shall pass to Buyer upon their delivery, f.o.b. Seller's factory (unless a different f.o.b. point is otherwise agreed to and accepted) to any agent of Buyer, including a common carrier or warehouse, as hereinafter provided. Wherever transportation rates and carrier's liability for damage depend upon the value of the shipment as declared by shipper, Seller will declare such value as will entitle Buyer to have goods shipped at the lowest permissible transportation rates unless otherwise instructed in writing by Buyer. Buyer will furnish written destination instructions for all goods as promptly as possible. Seller shall for the account and at the expense and risk of Buyer arrange for shipment of the goods by a carrier of its own selection to Buyer's destination. In the absence of destination instructions, Seller may at Buyer's expense and with notice to Buyer, warehouse the goods in a reasonably suitable manner. Seller shall not be liable for loss or damage attributed to negligence either in selection of the carrier or the warehouse or in agreeing with either of them to contract terms on Buyer's behalf. All shipments will be at shipper's option. Customer requested premium cost freight routing, including air freight will be shipped F.O.B. shipping point, freight collect to the customer. The promised shipping date is the Seller's best estimate and will not operate to bind Seller to ship or make deliveries on the date indicated on quotation or order acknowledgment.

#### 3. PRICE AND PAYMENT

Unless otherwise specified, all orders or contracts accepted will be invoiced at Seller's prices in effect on the date of shipment, which Buyer agrees to pay. Unless otherwise specified, payment terms are net 30 days, and overdue accounts shall accrue charges at a rate of 1.5% (0.015) per month or the maximum legal rate, whichever is less. Credit and delivery shall be subject to Seller's approval and Seller reserves the right to alter the terms and fix a limit of credit. Each order or contract shall be treated as a distinct contract but if Buyer shall fail to fulfill the terms of payment, Seller may without prejudice to any other lawful remedy defer further shipments, and/or cancel any order or contract. Buyer shall be liable to Seller for all costs and fees, including attorneys' fees, which Seller may reasonably incur in any actions by Seller taken to collect on any overdue account of Buyer. Unanticipated cost increases created by circumstances such as, but not limited to, changes in government energy policies, metal premium charges or raw materials price increases are not covered by the price quoted. Any order accepted requiring special manufacturing processes, inspection, specified weight, packaging, test results, certification, etc., is subject to additional charges (less a reasonable allowance for use, damage or obsolescence).

#### 4. INSPECTION

If upon receipt of the goods by Buyer at destination the same shall appear not to conform to this order or contract, Buyer shall within thirty (30) days after receipt thereof notify Seller of such condition and afford Seller a reasonable opportunity to inspect the goods and make any appropriate adjustment or replacement. The remedies afforded Buyer under the paragraph hereof entitled "LIMITED WARRANTIES, REMEDIES AND LIMITATIONS" shall be the exclusive remedies for defective goods whether or not discovered upon inspection by Buyer. Buyer shall not delay payment for the goods pending their inspection.

#### 5. LIMITED WARRANTIES, REMEDIES AND LIMITATIONS

a. Defective Goods: Seller warrants to Buyer that at the time of delivery the goods sold hereunder will be free from defects in design, material and manufacture and will conform substantially to Seller's applicable specifications as stipulated in the order or contract. Seller's liability and Buyer's remedy under this warranty are strictly limited to the refund of purchase price, repair or replacement, at Seller's sole option, of goods or materials sold which are returned to Seller and which are shown to Seller's reasonable satisfaction to have been defective provided that written notice of the defect shall have been given by Buyer to Seller within one year of delivery of such goods by the Seller. Transportation charges to and from Seller's location for the return of defective goods to Seller and their re-shipment to Buyer and the risk of loss thereof will be borne by Buyer. If services or data are to be furnished hereunder, Seller warrants to Buyer that such services will be performed or such data prepared in a good workmanlike manner. Seller's liability and Buyer's remedy under this warranty are limited to the correction of such services or data as are shown to Seller's reasonable satisfaction to have been defective, provided that written notice of such defective services or data shall have been given by Buyer to Seller within thirty (30) days after the performance of such services or delivery of such data by Seller.

b. Title: Seller warrants to Buyer that it will convey good title to the property sold. Seller's liability and Buyer's remedy under this warranty are strictly limited to the removal of any title defect or, at the sole option of the Seller, to the replacement of the goods or parts thereof which are defective in title; provided however, that the rights and remedies of the parties with respect to patent infringement shall be limited to the provisions of subparagraph c. Below.

c. Patent Infringement: Seller shall conduct, at its own expense, the entire defense of any claim, suit or action alleging that, without further combination, the use or resale by Buyer or any subsequent purchaser or user of the goods delivered hereunder, directly infringes any United States patent, but only on the conditions that, (1) Seller receives prompt written notice of such claim, suit or action, full opportunity and authority to assume the sole defense thereof including settlement and appeals, and all information available to Buyer and defendant for such defense, (2) said goods are made according to a specification or design furnished by Seller, or if a process patent is involved, the process performed by the goods is recommended in writing by Seller, and (3) the claim, suit or action is brought against Buyer or one expressly indemnified by Buyer. Provided all three of the foregoing conditions have been met, Seller shall, at its own expense, either settle said claim, suit or action or shall pay all damages excluding consequential damages and costs awarded by the court therein and, if the use or resale of such goods is finally enjoined, Seller shall, at Seller's option, procure for defendant the right to use or resell the goods, replace them with equivalent non-infringing goods, modify them so they become non-infringing but equivalent, or remove them and refund the purchase price.

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No indemnity is granted by Seller under the patents of any nation other than that specified above, nor with respect to any of the goods or components thereof manufactured according to a specification or design of anyone other than Seller. If a claim, suit or action is based on a specification or design furnished by Buyer or on the performance of a process not recommended in writing by Seller, or on the use or sale of the goods delivered hereunder in combination with other goods not delivered to Buyer by Seller, Buyer shall indemnify and save Seller harmless therefrom.

#### D. Exclusive Warranties and Remedies

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF (a) ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ARISING OUT OF THE CONDUCT OF THE PARTIES, AND (b) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY FOR SELLER'S NEGLIGENCE, ACTUAL OR IMPUTED. The remedies of the Buyer for breach of any warranty arising hereby, expressed or implied, or by operation of law, or for breach of any duty of Seller, expressed or implied or arising out of any conduct of the parties, shall be strictly limited to those provided herein to the exclusion of any and all other remedies including, without limitation, claims for incidental or consequential damages. No agreement varying or extending the foregoing warranties, remedies or these limitations will be binding upon Seller unless in writing, signed by a duly authorized executive officer of Seller.

#### 6. EXCUSABLE DELAYS

Buyer acknowledges that the goods and/or services called for hereunder are to be manufactured or provided by or for Seller to fulfill this order or contract and that the delivery date(s) is (are) based on the assumption that there will be no delay due to causes beyond the reasonable control of Seller. Seller shall not be charged with any liability for delay or non-delivery when due to delays of suppliers, acts of God or the public enemy, compliance in good faith with any applicable foreign or domestic governmental regulation or order, whether or not it proves to be invalid, fires, riots, labor disputes, unusually severe weather or any other cause beyond the reasonable control of Seller. To the extent such causes actually retard deliveries on the part of the Seller, the time for performance shall be extended for as many days beyond the date thereof as is required to obtain removal of such causes. This provision shall not, however relieve Seller from using its best efforts to avoid or remove such causes, and continue performance with reasonable dispatch whenever such causes are removed.

#### 7. TAXES

In addition to the agreed purchase price of the goods and/or services called for hereunder any and all taxes (not including any U.S. income or excess profit taxes attributable to Seller) which may be imposed by any taxing authority, arising from the sale, delivery or use of the goods and/or the furnishing of the services hereunder and for which Seller may be held responsible for collection or payment, either on its own behalf or that of Buyer, shall be paid by Buyer to Seller upon Seller's demand.

#### 8. FINANCIAL RESPONSIBILITY OF BUYER

If before completion of performance of any order or contract by Seller, a receiver or trustee is appointed for any of Buyer's property, or Buyer be adjudicated or voluntarily becomes a bankrupt under any bankruptcy, dissolution or re-organization laws or similar legislation, or if Buyer becomes insolvent or makes an assignment for the benefit of creditors, or an execution be issued pursuant to a judgement rendered against Buyer, or should Buyer be unable or refuse to make payment to Seller in accordance with any of its obligations to Seller, Seller may at its option in any of such events terminate any order or contract by giving to Buyer a

written notice of its intention so to do and Seller shall thereupon be relieved of any further obligation to Buyer and Buyer shall reimburse Seller for its termination costs and expenses and a reasonable allowance for profit.

#### 9. CANCELLATIONS AND RETURNS

Orders may be canceled, and goods may be returned for credit, only upon the prior approval of Seller and upon terms protecting Seller from loss. Due to raw material and manufacturing plant scheduling, all orders once placed with and accepted by Seller are non-cancelable without 4SProducts written approval. Seller will issue a formal RETURN MATERIAL AUTHORIZATION (RMA) tag to support all authorized returns. For any credit, this document must denote the Buyer's order number, Seller's invoice number, description, and quantity of item to be returned, and reason for request. Stock items are returnable at invoice price less 20% restocking charge. Freight prepaid to plant of manufacture. Non-stock items and/or special items are not subject to return. All material must be returned to Seller on the original pallets and in the original packaging.

#### 10. CHANGES

Seller may at its option modify Buyer's order where necessary by making any of the following changes: (a) substituting the latest or correct part number or part description for the part number or part description set forth on the order; (b) substituting Seller's prices in effect as applicable to the order for the prices set forth in Buyer's order; (c) substituting an estimated delivery schedule which is reasonable (considering Seller's stock availability and lead time) for the delivery schedule set forth on the order; (d) correcting any stenographical or typographical error on any document.

#### 11. APPENDICES

Any appendix or other terms and conditions of the Seller as may be attached hereto, be on the reverse hereof, and/or be identified herewith are hereby incorporated and made a part of these terms and conditions. All orders or contracts shall be subject to such additional terms and conditions which shall control over any inconsistency with the terms and conditions stated herein.

#### 12. ENTIRE AGREEMENT

The terms and conditions of this order or contract constitute the entire agreement between the parties hereto and shall supersede all previous communications, representations or agreements, either oral or written between the parties hereto with respect to the subject matter hereof.

#### 13. CHANGES - PROCESS, MATERIAL AND PRODUCT DESIGN

Seller continually develops and uses new processes, materials and product designs in an effort to improve its products, while maintaining conformity to specifications. If your applications of our products rely upon any performance, dimensional or content criteria other than as required by the applicable specifications, you must conduct regular testing or evaluation of those specific products. Seller makes no warranty or representation of any nature that any material shipped conforms to any material of like product description as may have previously been delivered to you, except as to the applicable specifications.