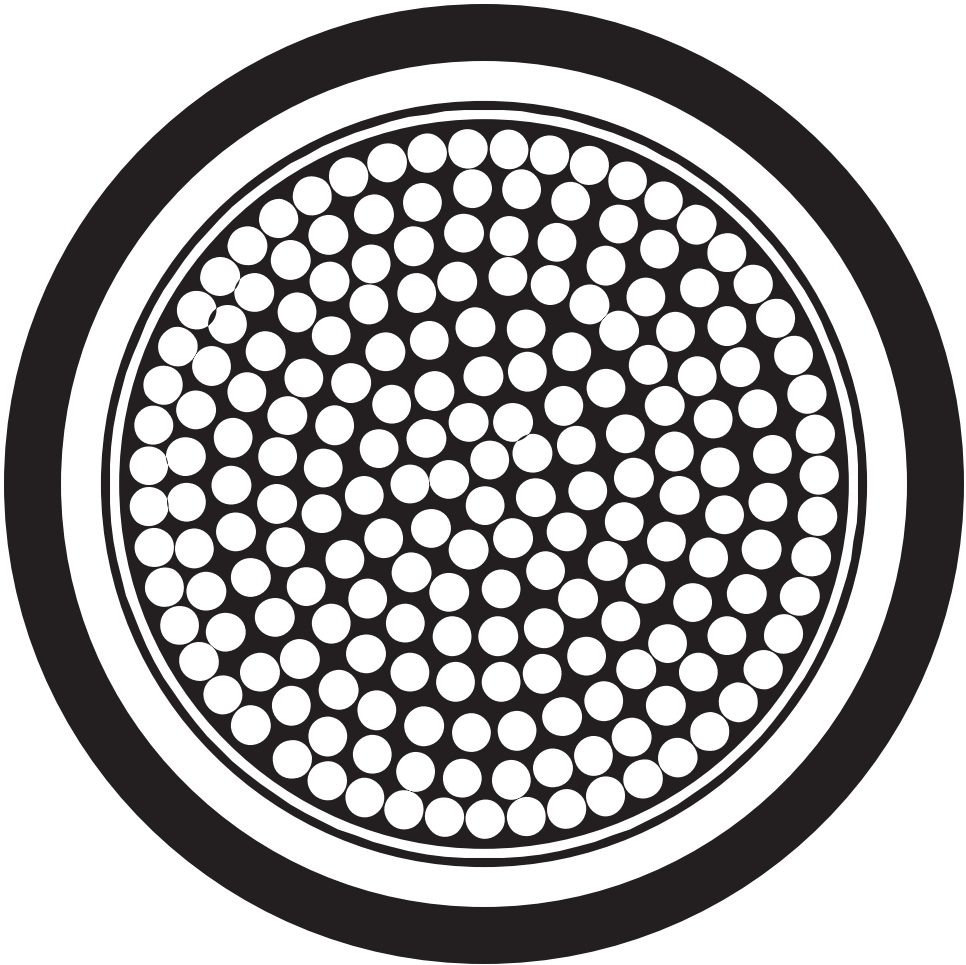


catalog | **Copper
Cables**



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

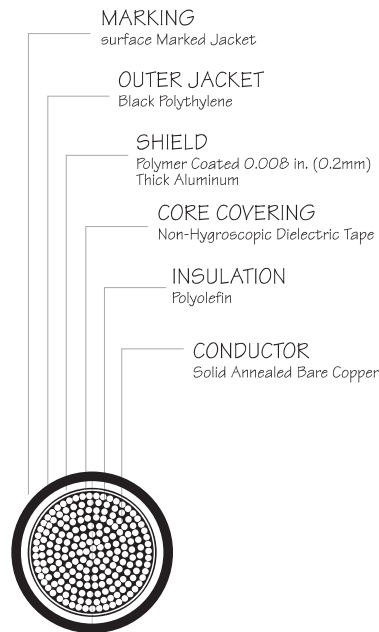
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information such as manufacturer's identification, pair count AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: ALFOUR® cables are also available with an internal screen for use with carrier T1 systems.

Cable cut-away



Applications

4SProducts ALFOUR® cables are designed primarily for aerial use. In addition, they are also commonly used for buried applications. In an aerial application, the cable must be attached to a support strand (messenger). ALFOUR® cables, in 19, 22, 24 and 26 AWG, are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-85-625-2002; formerly manufactured to REA Specification PE-22 (PE-22 was deactivated by RUS and is superseded by ANSI/ICEA specifications).

**Technical
Data Sheet**

Aluminum Shield | Single Jacket | AirCore

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.3	10.9	45.0	28.0	1.5	5.0	5,000	10,000
22	0.64	1.0	1.6	4.6	15.3	91.0	56.5	1.5	5.0	4,000	10,000
24	0.50	1.0	1.6	5.7	19.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.2	23.6	232.0	144.2	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

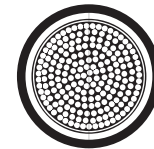
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT worst pair (dB)	
	58		47	
	53		42	

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA-568.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

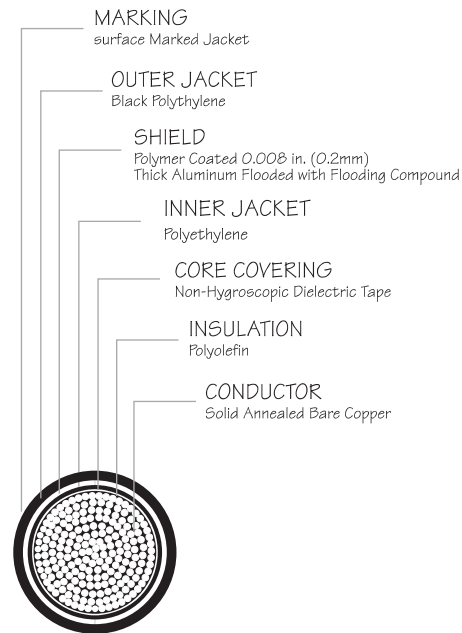
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap.

Outer Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Inner Jacket: A black polyethylene jacket.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Cable cut-away



Applications

4SProducts ALFOUR®-2 cables are designed for direct burial or duct applications where protection from moisture is required. ALFOUR®-2 cables may be used aerially, but must be attached to a support strand (messenger). ALFOUR®-2 cables, in 19, 22, 24 and 26 AWG, are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-85-625-2002; formerly manufactured to REA Specification PE-22 (PE-22 was deactivated by RUS and is superseded by ANSI/ICEA specifications).

Technical Data Sheet

Aluminum Shield | Double Jacket | AirCore

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.3	10.9	45.0	28.0	1.5	5.0	5,000	10,000
22	0.64	1.0	1.6	4.6	15.3	91.0	56.5	1.5	5.0	4,000	10,000
24	0.50	1.0	1.6	5.7	19.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.2	23.6	232.0	144.2	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

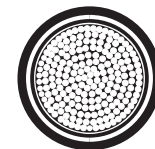
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT worst pair (dB)	
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA-568.



Technical Data Sheet

Aluminum Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

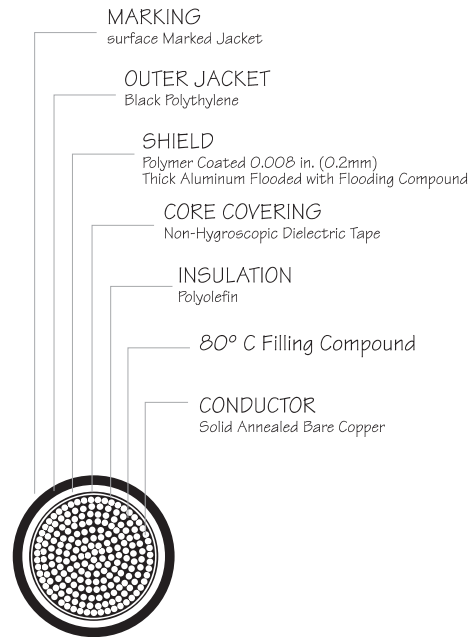
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: ALFOUR®-F cables are also available with an internal screen for use with T-Carrier systems.

Cable cut-away



Applications

4SProducts ALFOUR®-F cables are designed for direct burial or duct applications where protection from moisture is required. ALFOUR®-F cables may be used aerially, but must be attached to a support strand (messenger). ALFOUR®-F cables, in 19, 22, 24 and 26 AWG, are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-3-20 (PE-39).



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Technical Data Sheet

Aluminum Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	2.8	9.2	45.0	28.0	1.5	5.0	7,000	15,000
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000
26	0.40	1.0	1.6	6.4	21.0	232.0	144.0	1.5	5.0	2,800	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

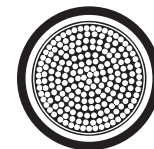
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT worst pair (dB)	
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

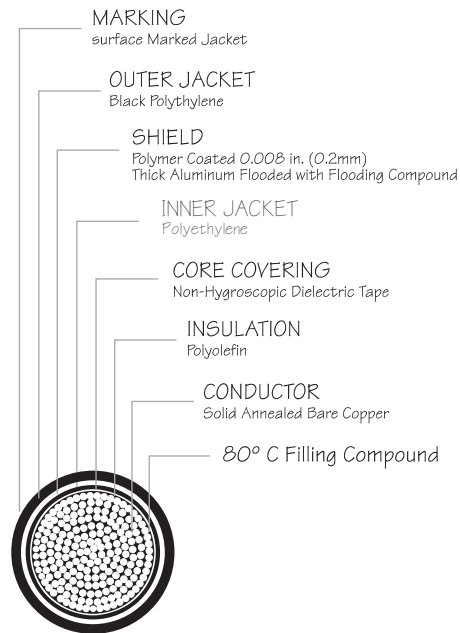
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Outer Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Inner Jacket: A black polyethylene jacket.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Cable cut-away



Applications

4SProducts ALFOUR®-2F cables are designed for direct burial or duct applications where protection from moisture is required. ALFOUR®-2F cables may be used aerially, but must be attached to a support strand (messenger). ALFOUR®-2F cables, in 19, 22, 24 and 26 AWG, are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-3-10 (PE-39).

Technical Data Sheet

Aluminum Shield | Double Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	2.8	9.2	45.0	28.0	1.5	5.0	7,000	15,000
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000
26	0.40	1.0	1.6	6.4	21.0	232.0	144.0	1.5	5.0	2,800	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

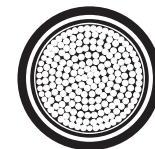
Near End Crosstalk (NEXT)	150 kHz	772 kHz
P.S. WUNEXT mean (dB)	58	47
P.S. WUNEXT worst pair (dB)	53	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA-568.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPA or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

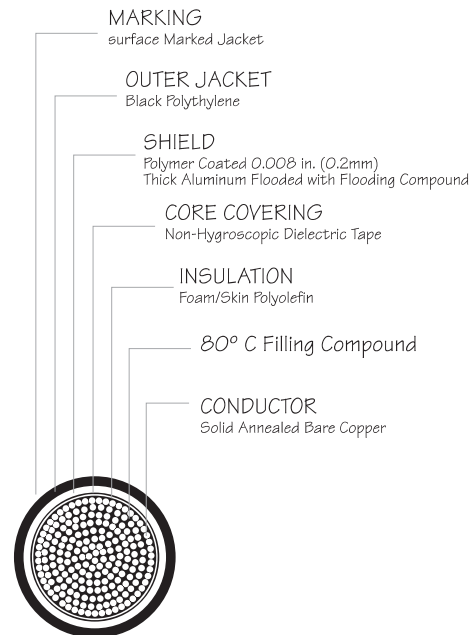
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: ALFOUR®-FS cables are also available with an internal screen for use with T-Carrier systems. ALFOUR®-FS cables are also available with

Cable cut-away



Applications

4SProducts ALFOUR®-FS cables are designed for direct burial or duct applications where protection from moisture is required. ALFOUR®-FS cables may be used aerially, but must be attached to a support strand (messenger). ALFOUR®-FS cables, in 19, 22, 24 and 26 AWG, are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-3-21 (PE-89).



Technical Data Sheet

Aluminum Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.2	10.5	45.0	28.0	1.5	5.0	4,500	10,000
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.0	23.3	232.0	144.0	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

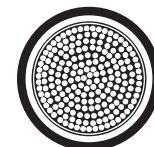
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT worst pair (dB)	
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

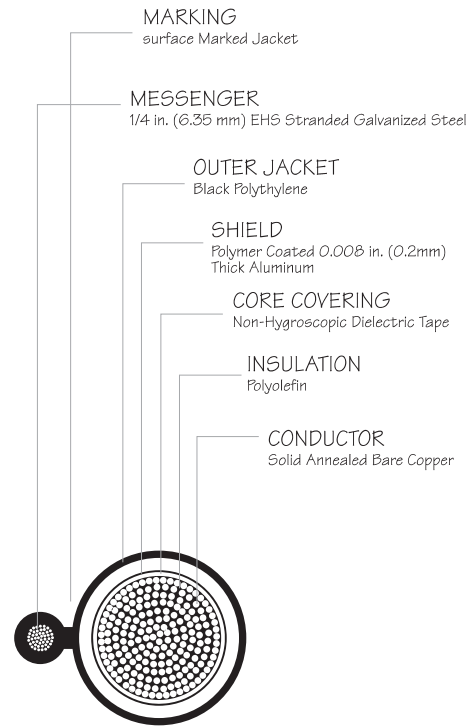
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap.

Support Member: A 1/4 inch, 7-strand Extra High Strength (EHS) galvanized steel messenger serves as the support member and is an integral part of the sheath. The messenger is flooded to inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information such as manufacturer's identification, pair count AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Cable cut-away



Applications

4SProducts ALFOUR®-8 cables are designed for aerial installations. The core and support member (messenger) lay parallel to each other forming a cross-sectional "Figure 8". The messenger is an integral part of the cable sheath, yet readily available for gripping, pulling and tensioning. Installation is fast and easy using standard methods and hardware. ALFOUR®-8 cables, in 19, 22, 24 and 26 AWG are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-85-625-1996; formerly manufactured to REA Specification PE-38, PE-38 was deactivated by RUS (REA) in 1993 and is superseded by the ANSI/ICEA specifications.

Technical Data Sheet

Aluminum Shield | Single Jacket | AirCore | Fig-8

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.3	10.9	45.0	28.0	1.5	5.0	5,000	10,000
22	0.64	1.0	1.6	4.6	15.3	91.0	56.5	1.5	5.0	4,000	10,000
24	0.50	1.0	1.6	5.7	19.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.2	23.6	232.0	144.2	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

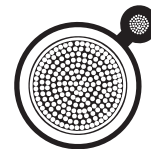
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT worst pair (dB)	
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

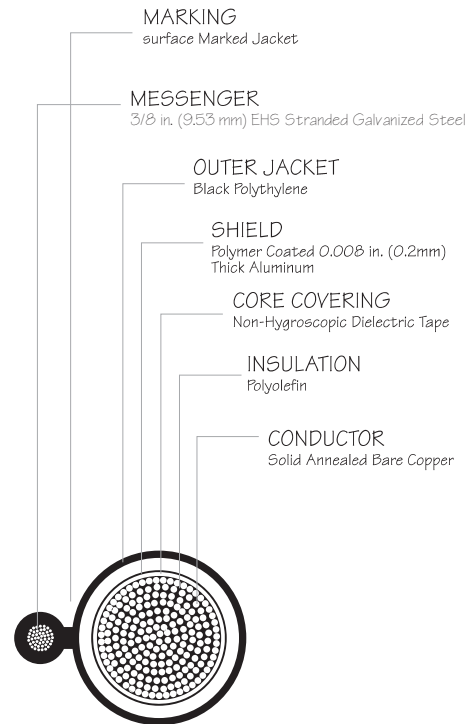
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap.

Support Member: A 3/8 inch, 7-strand Extra High Strength (EHS) galvanized steel messenger serves as the support member and is an integral part of the sheath. The messenger is flooded to inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information such as manufacturer's identification, pair count AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Cable cut-away



Applications

4SProducts ALFOUR®-83 cables are designed for aerial installations. The core and support member (messenger) lay parallel to each other forming a cross-sectional "Figure 8". The messenger is an integral part of the cable sheath, yet readily available for gripping, pulling and tensioning. Installation is fast and easy using standard methods and hardware. ALFOUR®-83 cables, in 19, 22, 24 and 26 AWG are capable of meeting the electrical requirements of 100 ohms, Category 3, Backbone UTP Cables as specified in TIA/EIA-568-A.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-85-625-1996; formerly manufactured to REA Specification PE-38, PE-38 was deactivated by RUS (REA) in 1993 and is superseded by the ANSI/ICEA specifications.

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.3	10.9	45.0	28.0	1.5	5.0	5,000	10,000
22	0.64	1.0	1.6	4.6	15.3	91.0	56.5	1.5	5.0	4,000	10,000
24	0.50	1.0	1.6	5.7	19.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.2	23.6	232.0	144.2	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

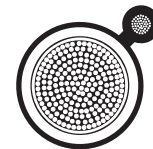
Near End Crosstalk (NEXT)		150 kHz		772 kHz	
P.S. WUNEXT mean (dB)		58		47	
P.S. WUNEXT worst pair (dB)		53		42	

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Description

Conductors: Solid annealed bare copper in 22 and 24 AWG.

Insulation: Conductors are insulated. The conductor insulation is color-coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs and less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color-coded binders.

Filling Compound: The core assembly is filled with an 80°C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

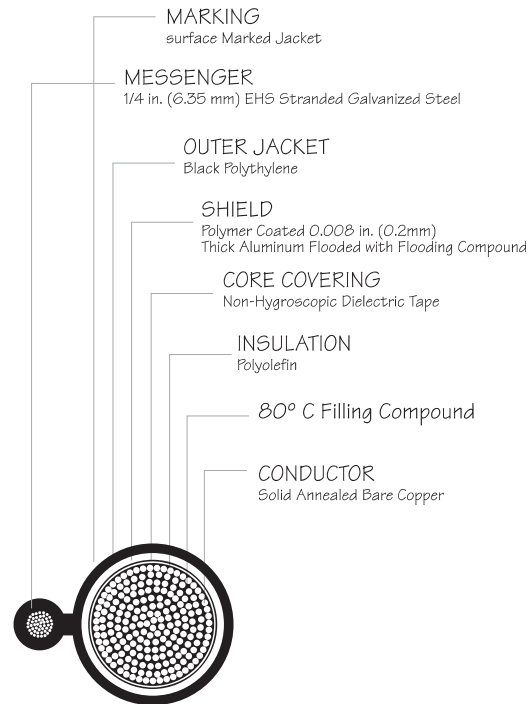
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Support Member: A 1/4 inch, 7-strand Extra High Strength (EHS) galvanized steel messenger serves as the support member and is an integral part of the sheath. The messenger is flooded to inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information including the manufacturer's identification, pair count, AWG and product identification appears at 2-foot intervals. Sequential length markings appear at alternate 2-foot intervals.

Cable cut-away



Applications

4SProducts ALFOUR®-8F cables are designed for aerial applications where a filled cable design is preferred. The core and support member (messenger) lay parallel to each other forming a cross-sectional "Figure 8". The messenger is an integral part of the cable sheath, yet readily available for gripping, pulling and tensioning. Installation is fast and easy using standard methods and hardware.

Qualifications & Approvals

ALFOUR-8F cables meet the physical and electrical requirements of RUS specification 7 CFR 1755.390 (PE-39) latest issue, except that the figure-8 sheath shall meet the requirements of ANSI/ICEA S-85-625-2002, Option A.

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	22	24	-	-
P.S. ELFEXT mean (dB)	63	63	-	-
P.S. ELFEXT worst pair (dB)	57	57	-	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	22	24	-	-
P.S. ELFEXT mean (dB)	49	49	-	-
P.S. ELFEXT worst pair (dB)	43	43	-	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Description

Conductors: Solid annealed bare copper in 22 and 24 AWG.

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color-coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs and less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color-coded binders.

Filling Compound: The core assembly is filled with an 80°C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

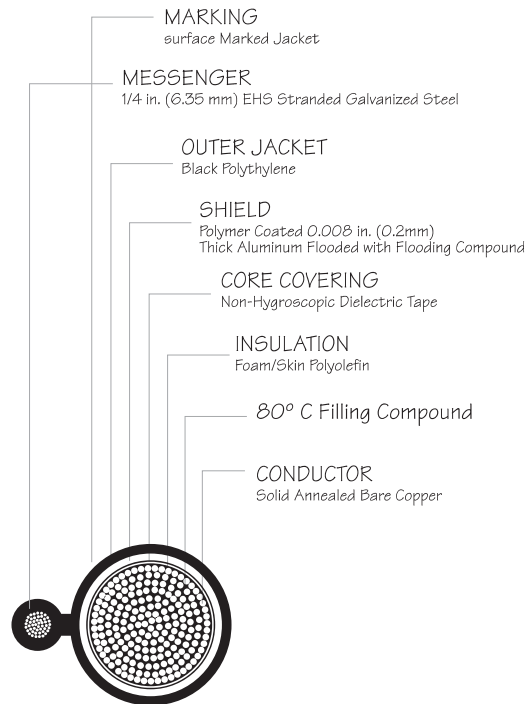
Shielding: A corrugated, copolymer coated, 8-mil aluminum tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Support Member: A ¼ inch, 7-strand Extra High Strength (EHS) galvanized steel messenger serves as the support member and is an integral part of the sheath. The messenger is flooded to inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information including the manufacturer's identification, pair count, AWG and product identification appears at 2-foot intervals. Sequential length markings appear at alternate 2-foot

Cable cut-away



Applications

4SProducts ALFOUR®-8fS cables are designed for aerial applications where a filled cable design is preferred and/or protection from moisture is required. The core and support member (messenger) lay parallel to each other forming a cross-sectional "Figure 8". The messenger is an integral part of the cable sheath, yet readily available for gripping, pulling and tensioning. Installation is fast and easy using standard methods and hardware.

Qualifications & Approvals

ALFOUR-8fS cables meet the physical and electrical requirements of RUS specification 7 CFR 1755.890 (PE-89) latest issue, except that the figure-8 sheath shall meet the requirements of ANSI/ICEA S-85-625-2002, Option A.

Technical Data Sheet

Aluminum Shield | Single Jacket | Filled - Foam Skin | Fig-8

Pair Count 6 - 200P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

Near End Crosstalk (NEXT)	150 kHz	772 kHz
P.S. WUNEXT mean (dB)	58	47
P.S. WUNEXT worst pair (dB)	53	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	22	24	-	-
P.S. ELFEXT mean (dB)	63	63	-	-
P.S. ELFEXT worst pair (dB)	57	57	-	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	22	24	-	-
P.S. ELFEXT mean (dB)	49	49	-	-
P.S. ELFEXT worst pair (dB)	43	43	-	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin. The conductor insulation is color coded in accordance with industry standard.

Twisted Pair: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

Shielding: The dual shielding system consists of two metal tapes. Inner: A corrugated, copolymer coated, 8-mil aluminum tape is applied directly over the core wrap. The aluminum tape does not butt or overlap at any point along the length of the cable. Outer: A corrugated, copolymer coated, 6-mil steel tape is applied directly over the aluminum and overlaps. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

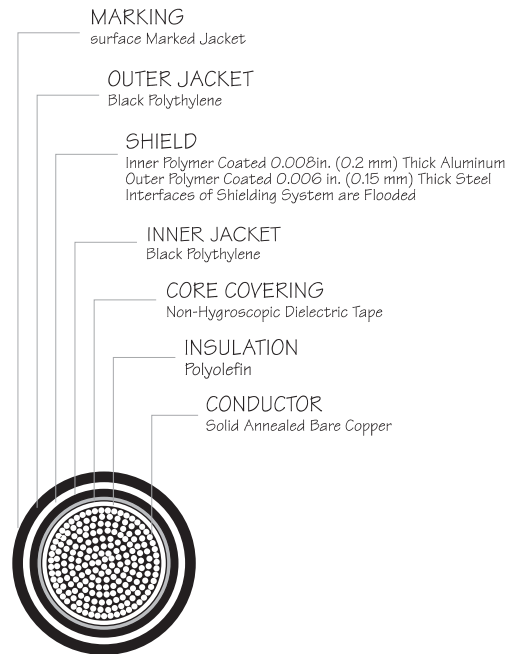
Outer Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Inner Jacket: A black polyethylene jacket.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: AsFOUR®-2 is available with an internal screen for use with T-Carrier systems.

Cable cut-away



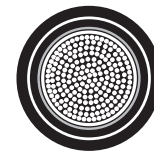
Applications

4SProducts AsFOUR®-2 cables are designed for direct burial or duct applications where protection from moisture is required. AsFOUR®-2 cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required. AsFOUR®-2 may be used aerially, but must be attached to a support strand.

ELECTRICAL CHARACTERISTICS	Conductor Size							
	AWG				mm			
	19	22	24	26	0.9	0.64	0.5	0.4
All values at or corrected to 20°C.								
Mutual Capacitance nF/mile (nF/km) Average ≤ 12 pair > 12 pair Maximum Individual ≤ 12 pair > 12 pair	83 ± 7 83 ± 4				(52 ± 4) (52 ± 2)			
Capacitance Unbalance pF/kft (pF/km) Pair to Pair Maximum Individual Maximum RMS (> 12 pair) Pair to Ground Maximum Individual Maximum Average (> 12 pair)	80 25 800 175				(145) (45) (2,625) (574)			
Far-End Crosstalk dB/kft (dB/km) Power Sum Mean 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz: Power Sum Worst Pair: 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz:	65 51 44 39 33	63 49 43 37 31	63 49 42 37 31	61 47 41 35 29	(60) (46) (39) (34) (28)	(58) (44) (38) (32) (26)	(58) (44) (37) (32) (26)	(56) (42) (36) (30) (24)
Near-End Crosstalk dB/kft (dB/km) Power Sum Mean 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz: Power Sum Worst Pair: 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz:	58 47 43 38 34				(58) (47) (43) (38) (34)			
Attenuation dB/kft (dB/km) Maximum Average (≤ 12 pair) 150 kHz: (> 12 pair) 150 kHz: (≤ 12 pair) 772 kHz: (> 12 pair) 772 kHz:	1.5 1.4 3.6 3.3	2.2 2.0 5.2 4.7	3.0 2.7 6.5 5.9	4.0 3.6 8.1 7.4	(5.1) (4.6) (11.9) (10.8)	(7.3) (6.6) (16.9) (15.4)	(9.8) (8.9) (21.3) (19.4)	(13.0) (11.8) (26.7) (24.3)
Insulation Resistance megaohm-mile (megaohm-km)	1000				(1600)			
High Voltage Test dc Voltage for 3 seconds Conductor-to-Conductor Conductor-to-Shield	5,000 20,000	4,000 20,000	3,000 20,000	2,400 20,000	5,000 20,000	4,000 20,000	3,000 20,000	2,400 20,000
Conductor Resistance Ohm /mile (Ohm /km) Maximum Individual	45.0	91.0	144.0	232.0	(28.0)	(56.6)	(89.5)	(144.2)
Resistance Unbalance Percent Maximum Average Maximum Individual	1.5 5.0				1.5 5.0			



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are insulated with solid polyolefin. The conductor insulation is color coded in accordance with industry standard.

Twisted Pair: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

Shielding: The dual shielding system consists of two metal tapes. Inner: A corrugated, copolymer coated, 8-mil aluminum tape is applied directly over the core wrap. The aluminum tape does not butt or overlap at any point along the length of the cable. Outer: A corrugated, copolymer coated, 6-mil steel tape is applied directly over the aluminum and overlaps. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Support Member: A 1/4 inch, 7-strand Extra High Strength (EHS) galvanized steel messenger serves as the support member and is an integral part of the sheath. The messenger is flooded to inhibit corrosion.

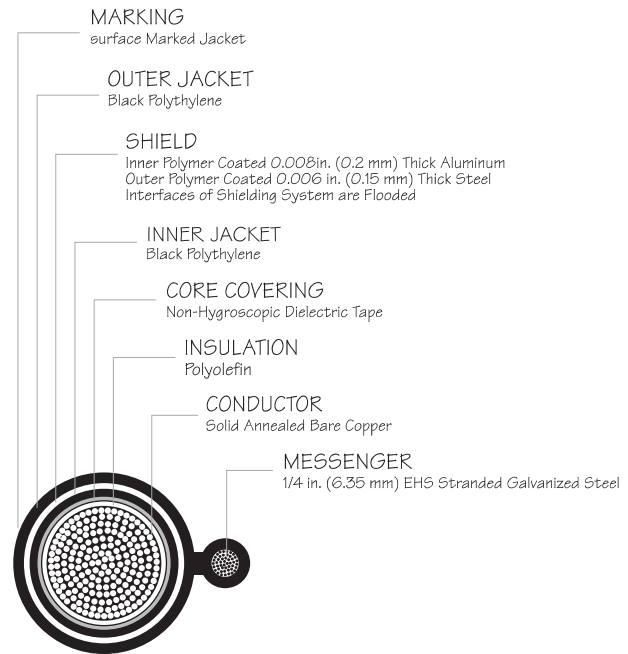
Outer Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Inner Jacket: A black polyethylene jacket.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: AsFOUR®-2-8 is available with an internal screen for use with T-Carrier systems.

Cable cut-away



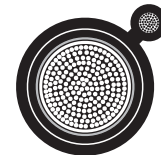
Applications

4SProducts AsFOUR®-2-8 cables are designed for aerial installations. The core and support member (messenger) lay parallel to each other forming a cross-sectional "figure 8". The messenger is an integral part of the cable sheath, yet readily available for gripping, pulling and tensioning. Installation is fast and easy using standard methods and hardware.

ELECTRICAL CHARACTERISTICS	Conductor Size							
	AWG				mm			
	19	22	24	26	0.9	0.64	0.5	0.4
All values at or corrected to 20°C.								
Mutual Capacitance nF/mile (nF/km) Average ≤ 12 pair > 12 pair Maximum Individual ≤ 12 pair > 12 pair	83 ± 7 83 ± 4				(52 ± 4) (52 ± 2)			
Capacitance Unbalance pF/kft (pF/km) Pair to Pair Maximum Individual Maximum RMS (> 12 pair) Pair to Ground Maximum Individual Maximum Average (> 12 pair)	80 25 800 175				(145) (45) (2,625) (574)			
Far-End Crosstalk dB/kft (dB/km) Power Sum Mean 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz: Power Sum Worst Pair: 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz:	65 51 44 39 33	63 49 43 37 31	63 49 42 37 31	61 47 41 35 29	(60) (46) (39) (34) (28)	(58) (44) (38) (32) (26)	(58) (44) (37) (32) (26)	(56) (42) (36) (30) (24)
Near-End Crosstalk dB/kft (dB/km) Power Sum Mean 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz: Power Sum Worst Pair: 0.150 MHz: 0.772 MHz: 1.600 MHz: 3.150 MHz: 6.300 MHz:	58 47 43 38 34				(58) (47) (43) (38) (34)			
Attenuation dB/kft (dB/km) Maximum Average (≤ 12 pair) 150 kHz: (> 12 pair) 150 kHz: (≤ 12 pair) 772 kHz: (> 12 pair) 772 kHz:	1.5 1.4 3.6 3.3	2.2 2.0 5.2 4.7	3.0 2.7 6.5 5.9	4.0 3.6 8.1 7.4	(5.1) (4.6) (11.9) (10.8)	(7.3) (6.6) (16.9) (15.4)	(9.8) (8.9) (21.3) (19.4)	(13.0) (11.8) (26.7) (24.3)
Insulation Resistance megaohm-mile (megaohm-km)	1000				(1600)			
High Voltage Test dc Voltage for 3 seconds Conductor-to-Conductor Conductor-to-Shield	5,000 20,000	4,000 20,000	3,000 20,000	2,400 20,000	5,000 20,000	4,000 20,000	3,000 20,000	2,400 20,000
Conductor Resistance Ohm /mile (Ohm /km) Maximum Individual	45.0	91.0	144.0	232.0	(28.0)	(56.6)	(89.5)	(144.2)
Resistance Unbalance Percent Maximum Average Maximum Individual	1.5 5.0				1.5 5.0			



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Description

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

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

CORE WRAP: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

SHIELDING: The dual shielding system consists of two metal tapes.

Inner: A corrugated, copolymer coated, 8-mil aluminum tape is applied directly over the core wrap. The aluminum tape does not butt or overlap at any point along the length of the cable.

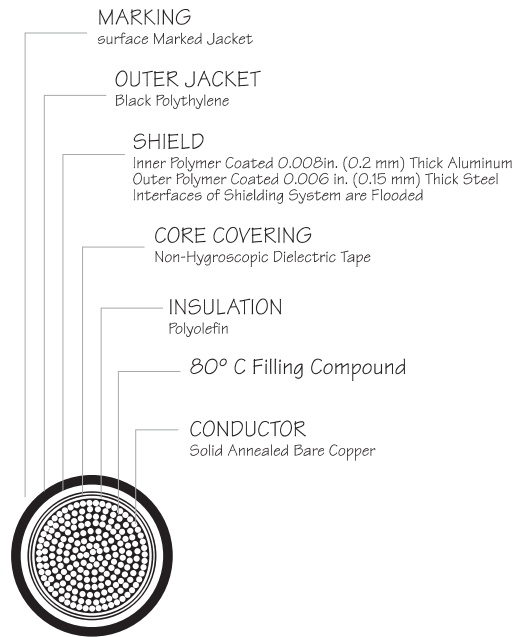
Outer: A corrugated, copolymer coated, 6-mil steel tape is applied directly over the aluminum and overlaps. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes, and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: AsFOUR®-f is available with an internal screen for use with T-Carrier systems. AsFOUR®-f+M is also available with mechanical protection.

Cable cut-away



Applications

4SProducts AsFOUR®-f cables are designed for use in duct or direct burial applications where protection from moisture is required. AsFOUR®-f cables may be used aerially, but must be attached to a support strand (messenger). AsFOUR®-f cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-1-2, IEC 60332-3-21, IEC 60332-3-22, IEC 60332-3-23, IEC 60332-3-24, IEC 60332-3-25, IEC 60332-3-26, IEC 60332-3-27, IEC 60332-3-28, IEC 60332-3-29, IEC 60332-3-30, IEC 60332-3-31, IEC 60332-3-32, IEC 60332-3-33, IEC 60332-3-34, IEC 60332-3-35, IEC 60332-3-36, IEC 60332-3-37, IEC 60332-3-38, IEC 60332-3-39, IEC 60332-3-40, IEC 60332-3-41, IEC 60332-3-42, IEC 60332-3-43, IEC 60332-3-44, IEC 60332-3-45, IEC 60332-3-46, IEC 60332-3-47, IEC 60332-3-48, IEC 60332-3-49, IEC 60332-3-50, IEC 60332-3-51, IEC 60332-3-52, IEC 60332-3-53, IEC 60332-3-54, IEC 60332-3-55, IEC 60332-3-56, IEC 60332-3-57, IEC 60332-3-58, IEC 60332-3-59, IEC 60332-3-60, IEC 60332-3-61, IEC 60332-3-62, IEC 60332-3-63, IEC 60332-3-64, IEC 60332-3-65, IEC 60332-3-66, IEC 60332-3-67, IEC 60332-3-68, IEC 60332-3-69, IEC 60332-3-70, IEC 60332-3-71, IEC 60332-3-72, IEC 60332-3-73, IEC 60332-3-74, IEC 60332-3-75, IEC 60332-3-76, IEC 60332-3-77, IEC 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Technical Data Sheet

Aluminum Steel Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1200P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nF/mile		nF/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	2.8	9.2	45.0	28.0	1.5	5.0	7,000	15,000
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

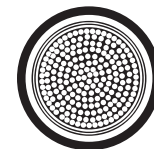
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)	58	47	
P.S. WUNEXT worst pair (dB)	53	42		

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	65	63	63	-
P.S. ELFEXT worst pair (dB)	59	57	57	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	51	49	49	-
P.S. ELFEXT worst pair (dB)	45	43	43	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Technical Data Sheet

Aluminum Steel Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 3000P

Outside Plant Copper Cable - Exchange Cable

Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color coded in accordance with industry standard.

Twisted Pair: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

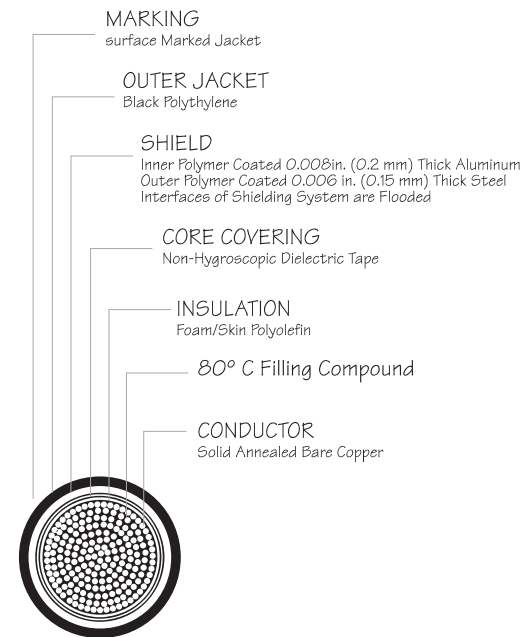
Shielding: The dual shielding system consists of two metal tapes. Inner: A corrugated, copolymer coated, 8-mil aluminum tape is applied directly over the core wrap. The aluminum tape does not butt or overlap at any point along the length of the cable. Outer: A corrugated, copolymer coated, 6-mil steel tape is applied directly over the aluminum and overlaps. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: AsFOUR®-FS is available with an internal screen for use with T-Carrier systems. AsFOUR®-FS is also available with mechanical protection.

Cable cut-away



Applications

4SProducts AsFOUR®-FS cables are designed for direct burial or duct applications where protection from moisture is required. AsFOUR®-FS cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required. AsFOUR®-FS may be used aerially, but must be attached to a support strand.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-3-21, IEC 60332-3-22, IEC 60332-3-23, IEC 60332-3-24, IEC 60332-3-25, IEC 60332-3-26, IEC 60332-3-27, IEC 60332-3-28, IEC 60332-3-29, IEC 60332-3-30, IEC 60332-3-31, IEC 60332-3-32, IEC 60332-3-33, IEC 60332-3-34, IEC 60332-3-35, IEC 60332-3-36, IEC 60332-3-37, IEC 60332-3-38, IEC 60332-3-39, IEC 60332-3-40, IEC 60332-3-41, IEC 60332-3-42, IEC 60332-3-43, IEC 60332-3-44, IEC 60332-3-45, IEC 60332-3-46, IEC 60332-3-47, IEC 60332-3-48, IEC 60332-3-49, IEC 60332-3-50, IEC 60332-3-51, IEC 60332-3-52, IEC 60332-3-53, IEC 60332-3-54, IEC 60332-3-55, IEC 60332-3-56, IEC 60332-3-57, IEC 60332-3-58, IEC 60332-3-59, IEC 60332-3-60, IEC 60332-3-61, IEC 60332-3-62, IEC 60332-3-63, IEC 60332-3-64, IEC 60332-3-65, IEC 60332-3-66, IEC 60332-3-67, IEC 60332-3-68, IEC 60332-3-69, IEC 60332-3-70, IEC 60332-3-71, IEC 60332-3-72, IEC 60332-3-73, IEC 60332-3-74, IEC 60332-3-75, IEC 60332-3-76, IEC 60332-3-77, IEC 60332-3-78, IEC 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Technical Data Sheet

Aluminum Steel Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 3000P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.2	10.5	45.0	28.0	1.5	5.0	4,500	10,000
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.0	23.3	232.0	144.0	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

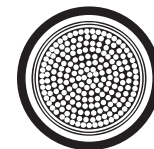
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
P.S. WUNEXT mean (dB)	58		47	
P.S. WUNEXT worst pair (dB)	53		42	

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Technical Data Sheet

Aluminum Steel Shield | Dual Jacket | Filled - Foam Skin

Pair Count 6 - 3000P

Outside Plant Copper Cable - Exchange Cable

Description

Conductors: Solid annealed copper in 19, 22, 24 and 26 AWG.

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color coded in accordance with industry standard.

Twisted Pair: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

Shielding: The dual shielding system consists of two metal tapes. Inner: A corrugated, copolymer coated, 8-mil aluminum tape is applied directly over the core wrap. The aluminum tape does not butt or overlap at any point along the length of the cable. Outer: A corrugated, copolymer coated, 6-mil steel tape is applied directly over the aluminum and overlaps. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

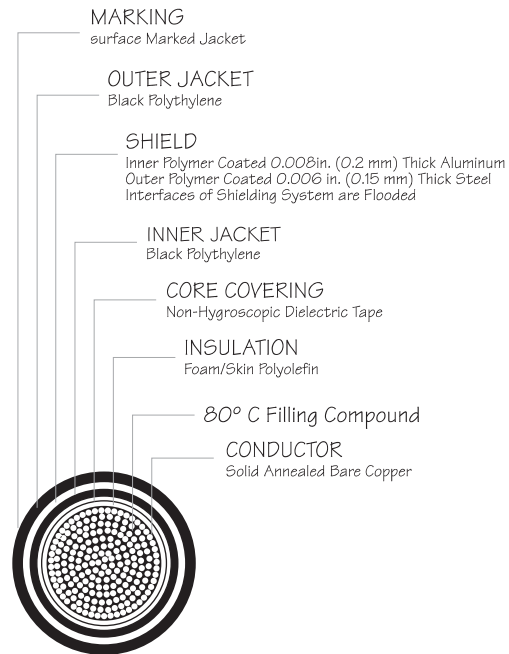
Outer Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Inner Jacket: A black polyethylene jacket.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: AsFOUR®-2fS is available with an internal screen for use with T-Carrier systems.

Cable cut-away



Applications

4SProducts AsFOUR®-2fS cables are designed for direct burial or duct applications where protection from moisture is required. AsFOUR®-2fS cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required. AsFOUR®-2fS may be used aerially, but must be attached to a support strand.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-1-2, IEC 60332-3-22, IEC 60332-3-23, IEC 60332-3-24, IEC 60332-3-25, IEC 60332-3-26, IEC 60332-3-27, IEC 60332-3-28, IEC 60332-3-29, IEC 60332-3-30, IEC 60332-3-31, IEC 60332-3-32, IEC 60332-3-33, IEC 60332-3-34, IEC 60332-3-35, IEC 60332-3-36, IEC 60332-3-37, IEC 60332-3-38, IEC 60332-3-39, IEC 60332-3-40, IEC 60332-3-41, IEC 60332-3-42, IEC 60332-3-43, IEC 60332-3-44, IEC 60332-3-45, IEC 60332-3-46, IEC 60332-3-47, IEC 60332-3-48, IEC 60332-3-49, IEC 60332-3-50, IEC 60332-3-51, IEC 60332-3-52, IEC 60332-3-53, IEC 60332-3-54, IEC 60332-3-55, IEC 60332-3-56, IEC 60332-3-57, IEC 60332-3-58, IEC 60332-3-59, IEC 60332-3-60, IEC 60332-3-61, IEC 60332-3-62, IEC 60332-3-63, IEC 60332-3-64, IEC 60332-3-65, IEC 60332-3-66, IEC 60332-3-67, IEC 60332-3-68, IEC 60332-3-69, IEC 60332-3-70, IEC 60332-3-71, IEC 60332-3-72, IEC 60332-3-73, IEC 60332-3-74, IEC 60332-3-75, IEC 60332-3-76, IEC 60332-3-77, IEC 60332-3-78, IEC 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Technical Data Sheet

Aluminum Steel Shield | Dual Jacket | Filled - Foam Skin

Pair Count 6 - 3000P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nf/mile		nf/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.2	10.5	45.0	28.0	1.5	5.0	4,500	10,000
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000
26	0.40	1.0	1.6	7.0	23.3	232.0	144.0	1.5	5.0	2,400	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	pF/kft	pF/km	pF/kft	pF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

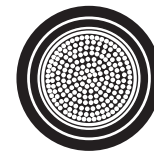
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
P.S. WUNEXT mean (dB)	58		47	
P.S. WUNEXT worst pair (dB)	53		42	

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	65	63	63	61
P.S. ELFEXT worst pair (dB)	59	57	57	57

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	26
P.S. ELFEXT mean (dB)	51	49	49	47
P.S. ELFEXT worst pair (dB)	45	43	43	43



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA/EIA.



Technical Data Sheet

Copper Clad Steel Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Description

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

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80°C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

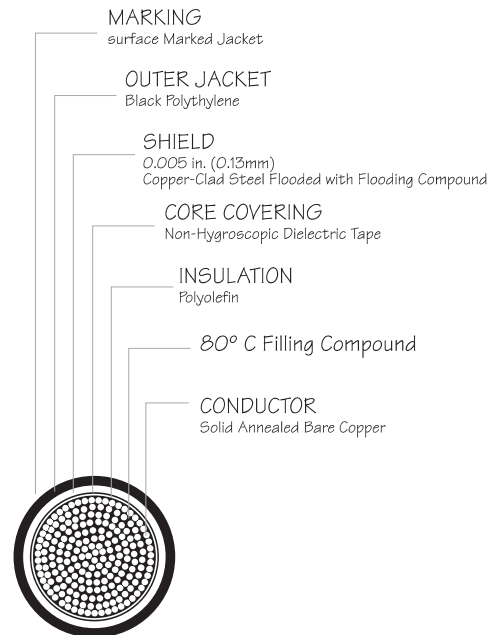
Shielding: A corrugated, gopher resistant, copper alloy or copper clad steel tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: CasFOUR®-f is available with an internal screen for use with T-Carrier systems. CasFOUR®-f is also available with mechanical protection.

Cable cut-away



Applications

4SProducts CasFOUR®-f cables are designed for use in duct or direct burial applications where protection from moisture is required. CasFOUR®-f cables may be used aerially, but must be attached to a support strand (messenger). CasFOUR®-f cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, AUS 7 CFR 1755.390 (PE-39).



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Technical Data Sheet

Copper Clad Steel Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nF/mile		nF/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	2.8	9.2	45.0	28.0	1.5	5.0	7,000	15,000
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

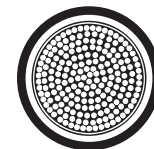
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	65	63	63	-
P.S. ELFEXT worst pair (dB)	59	57	57	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	51	49	49	-
P.S. ELFEXT worst pair (dB)	45	43	43	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Technical Data Sheet

Copper Clad Steel Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Description

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

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color coded in accordance with industry standards.

Twisted Pair: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80°C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

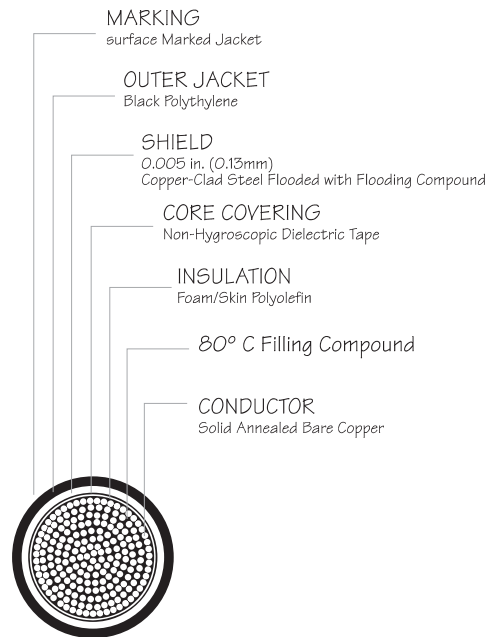
Shielding: A corrugated, gopher resistant, copper alloy or copper clad steel tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: CasFOUR®-FS is available with an internal screen for use with T-Carrier systems. CasFOUR®-FS is ALSO available with mechanical protection.

Cable cut-away



Applications

4SProducts CasFOUR®-FS cables are designed for direct burial or duct applications where protection from moisture is required. CasFOUR®-FS cables are recommended for use in high-risk areas where additional mechanical or rodent protection is required. CasFOUR®-FS cables may be used aerially, but must be attached to a support strand.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, AUS 7 CFR 1755.890 (PE-89).



www.4SProducts.com

Technical Data Sheet

Copper Clad Steel Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nF/mile		nF/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.2	10.5	45.0	28.0	1.5	5.0	4,500	10,000
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

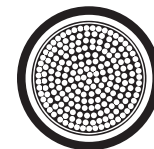
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	65	63	63	-
P.S. ELFEXT worst pair (dB)	59	57	57	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	51	49	49	-
P.S. ELFEXT worst pair (dB)	45	43	43	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/TIA-568.



Technical Data Sheet

Copper Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Description

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

Insulation: Conductors are insulated with solid polyolefin, color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80° C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

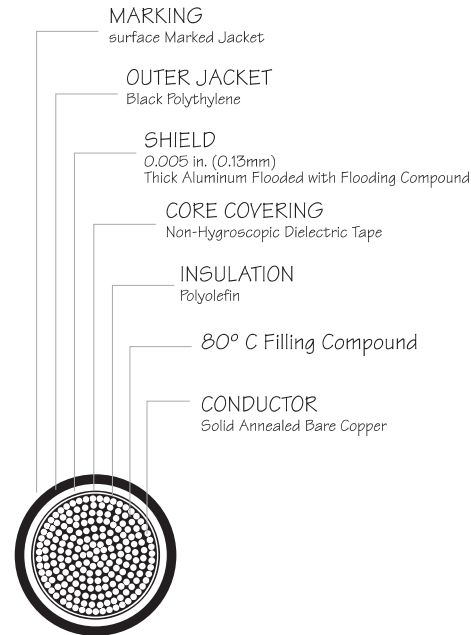
Shielding: A corrugated, 5-mil copper tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count, AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: CoFOUR®-f is available with an screen for use with T-Carrier systems. CoFOUR®-f + M is available with mechanical protection.

Cable cut-away



Applications

4SProducts CoFOUR®-f cables are designed for use in duct or direct burial applications where protection from moisture is required. CoFOUR®-f cables may be used aerially, but must be attached to a support strand.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, IEC 60332-3 (P1), IEC 60332-1 (P1).



www.4SProducts.com

Technical Data Sheet

Copper Shield | Single Jacket | Filled - Gel

Pair Count 6 - 1800P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nF/mile		nF/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	2.8	9.2	45.0	28.0	1.5	5.0	7,000	15,000
22	0.64	1.0	1.6	4.0	13.1	91.0	56.5	1.5	5.0	5,000	15,000
24	0.50	1.0	1.6	5.0	16.4	144.0	89.5	1.5	5.0	4,000	15,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

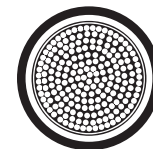
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)		P.S. WUNEXT mean (dB)	
	58		47	
	P.S. WUNEXT worst pair (dB)		P.S. WUNEXT worst pair (dB)	
	53		42	

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	65	63	63	-
P.S. ELFEXT worst pair (dB)	59	57	57	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	51	49	49	-
P.S. ELFEXT worst pair (dB)	45	43	43	-



Specifications are subject to change without notice. The data given is subject to normal manufacturing tolerances. 4SProducts Copper Communication Cables are designed and tested in accordance with the requirements of ANSI/ICEA.



Description

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

Insulation: Conductors are dual insulated with an inner layer of foamed, natural polyolefin covered by an outer layer of solid, colored polyolefin. The conductor insulation is color coded in accordance with industry standards.

Twisted Pairs: Individual conductors are twisted into pairs with varying lay lengths to minimize crosstalk and specific color combinations to provide pair identification.

Core Assembly: Cables of 25 pairs or less are assembled into a cylindrical core. Cables larger than 25 pairs are assembled into units, which are then used to assemble the core. Units are individually identifiable by color coded unit binders.

Filling Compound: The core assembly is filled with an 80°C ETPR or PIB base jelly compound, completely filling the interstices between the pairs and under the core wrap.

Core Wrap: A non-hygroscopic, dielectric tape is applied over the core assembly to provide protection for the core.

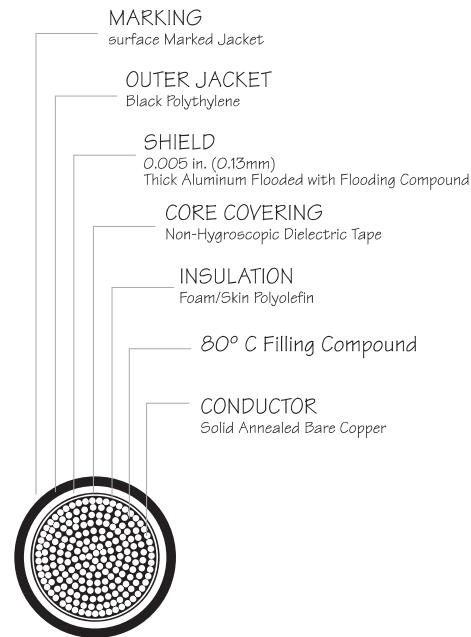
Shielding: A corrugated 5-mil copper tape is applied longitudinally with an overlap. The shield interfaces are flooded with an adhesive compound to provide a moisture barrier and inhibit corrosion.

Jacket: A black, linear low-density polyethylene jacket is applied overall. The jacket provides a tough protective covering designed to withstand exposure to direct sunlight, atmospheric temperature changes and stresses expected in standard installations.

Jacket Markings: Information, such as manufacturer's identification, pair count AWG, product identification and a telephone handset is printed at 2 ft. intervals on the cable jacket. Sequential footage markings are printed at alternate 2 ft. intervals.

Optional Designs: CoFOUR®-FS is available with an internal screen for use with T-Carrier systems. CoFOUR®-FS+M is also available with mechanical protection.

Cable cut-away



Applications

4SProducts CoFOUR®-FS cables are designed for direct burial or duct applications where protection from moisture is required. CoFOUR®-FS may be used aerially, but must be attached to a support strand.

Qualifications & Approvals

Manufactured to meet requirements of ANSI/ICEA S-84-608-2002, AUS 7 CFR 1755.890 (PE-89).

Technical Data Sheet

Copper Shield | Single Jacket | Filled - Foam Skin

Pair Count 6 - 2400P

Outside Plant Copper Cable - Exchange Cable

Average mutual capacitance @ 1000 Hz											
Total No. of pairs		nF/mile		nF/km							
12 or Less		83 ± 7		52 ± 4							
Over 12		83 ± 4		52 ± 2							
Conductor Size		Minimum Insulation Resistance		Average Maximum Attenuation		Maximum Conductor Resistance		Resistance Unbalance		Dielectric Strength DC Potential Volts	
		68 °F (20 °C)		68 °F (20 °C) 772 kHz		68 °F (20 °C) (ohms)		Maximum		Minimum	
AWG	mm	Gigohm/mile	Gigohm/km	dB/kft	dB/km	mile	km	Avg %	Individual pair %	Cdr to Cdr	Cdr to Ground
19	0.90	1.0	1.6	3.2	10.5	45.0	28.0	1.5	5.0	4,500	10,000
22	0.64	1.0	1.6	4.5	14.8	91.0	56.5	1.5	5.0	3,600	10,000
24	0.50	1.0	1.6	5.6	18.4	144.0	89.5	1.5	5.0	3,000	10,000

Capacitance unbalance Pair-to-Pair				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	80	145	-	-
more than 12	80	145	25	45

Capacitance unbalance Pair-to-Ground				
Pairs	Maximum individual		Maximum RMS	
	ρF/kft	ρF/km	ρF/kft	ρF/km
12 or Less	800	2625	-	-
more than 12	800	2625	175	574

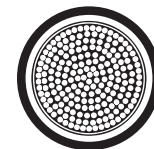
Near End Crosstalk (NEXT)	150 kHz		772 kHz	
	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)	P.S. WUNEXT mean (dB)	P.S. WUNEXT worst pair (dB)
	58	53	47	42

Far End Crosstalk (FEXT) @ 150 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	65	63	63	-
P.S. ELFEXT worst pair (dB)	59	57	57	-

Far End Crosstalk (FEXT) @ 772 kHz				
Conductor size (AWG)	19	22	24	-
P.S. ELFEXT mean (dB)	51	49	49	-
P.S. ELFEXT worst pair (dB)	45	43	43	-



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Technical
Data Sheet

Color Code Charts - Copper Cables

Pair Identification Colors

For pairs numbering 1 through 25, the pair identification colors are outlined below. In cable constructions containing more than 25 pairs, the colors are repeated as necessary. color coded binders are used to identify 25 pair groups of color coded pairs.

Pair Number	Tip Color	Ring Color	Pair Number	Tip Color	Ring Color
01	White	Blue	16	Yellow	Blue
02	White	Orange	17	Yellow	Orange
03	White	Green	18	Yellow	Green
04	White	Brown	19	Yellow	Brown
05	White	Slate	20	Yellow	Slate
06	Red	Blue	21	Violet	Blue
07	Red	Orange	22	Violet	Orange
08	Red	Green	23	Violet	Green
09	Red	Brown	24	Violet	Brown
10	Red	Slate	25	Violet	Slate
11	Black	Blue			
12	Black	Orange			
13	Black	Green			
14	Black	Brown			
15	Black	Slate			

Identification of Groups of Pairs

For cables through 600 pairs, 25 pair groups are identified by their binder colors in the same sequence as the pair identification is accomplished. Group 1 has White-Blue binders, Group 2 has White-Orange binders, etc. In this manner, each pair is uniquely identified. In cables having 25 pairs or less, binders are normally not used. However, if specified, the binders will be Group 1, White-Blue. For cables of 100-pairs or less, the use of the white binder is optional.

PairNumber	Group Number	Binder Color
01	001-025	White-Blue W-BL
02	026-050	White-Orange W-O
03	051-070	White-Green W-G
04	076-100	White-Brown W-BR
05	100-125	White-Slate W-S
06	126-150	Red-Blue R-BL
07	151-175	Red-Orange R-O
08	176-200	Red-Green R-G
09	201-225	Red-Brown R-BR
10	226-250	Red-Slate R-S
11	251-275	Black-Blue BK-BL
12	276-300	Black-Orange BK-O
13	301-325	Black-Green -G
14	326-350	Black-Brown BK-BR
15	351-375	Black-Slate BK-S
16	376-400	Yellow-Blue Y-BL
17	401-425	Yellow-Orange Y-O
18	426-450	Yellow-Green Y-G
19	451-475	Yellow-Brown Y-BR
20	476-500	Yellow-Slate Y-S
21	501-525	Violet-Blue V-BL
22	526-550	Violet-Orange V-O
23	551-575	Violet-Green V-G
24	576-600	Violet-Brown V-BR
		Violet-Slate V-S

Super-units Binder Identification Colors

It is desirable for manufacturing purposes to combine four 25 pair groups into "super units" when cables have 900 pairs or more.

Pair Number	Group Number	Binder Color	
0001-0600	001-024	White	W
0601-1200	025-048	Red	R
1201-1800	049-072	Black	BK
1801-2400	073-096	Yellow	Y
2401-3000	097-120	Violet	V

Spare Pairs

Cable of 100 pairs and above may include spare pairs to replace the defective pairs (if any) during production. The number of spare pairs shall not exceed 1% of the nominal pair size. A part of these spare pairs used for the manufacture. A part of these spare pairs used by the manufacturer, the cable shall not include any other spare pairs for the end user.

International Shipping & Packaging

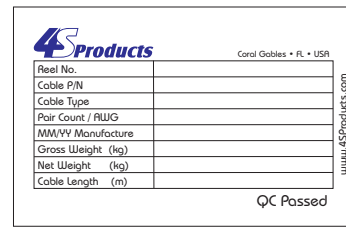
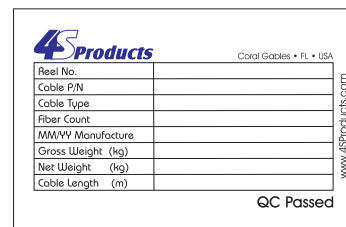
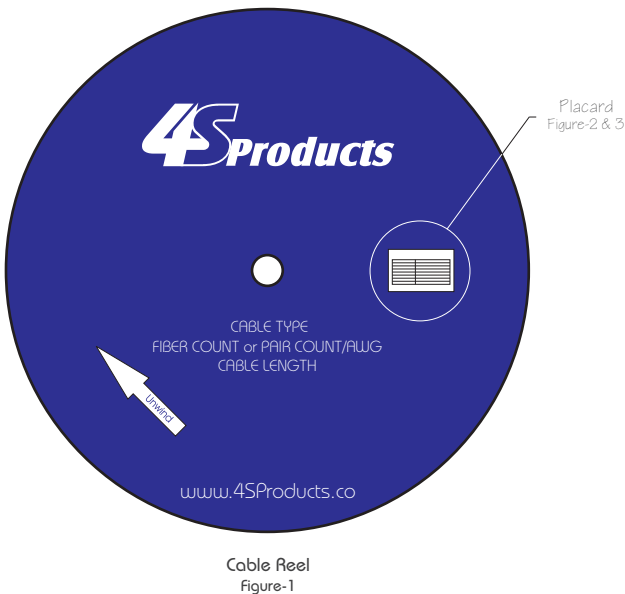
Cable is supplied in lengths specified at the time of purchase. Each length will be shipped on a separate non-returnable wooden reel. The minimum barrel diameter of the reel will not be less than 30 times the cable diameter.

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.