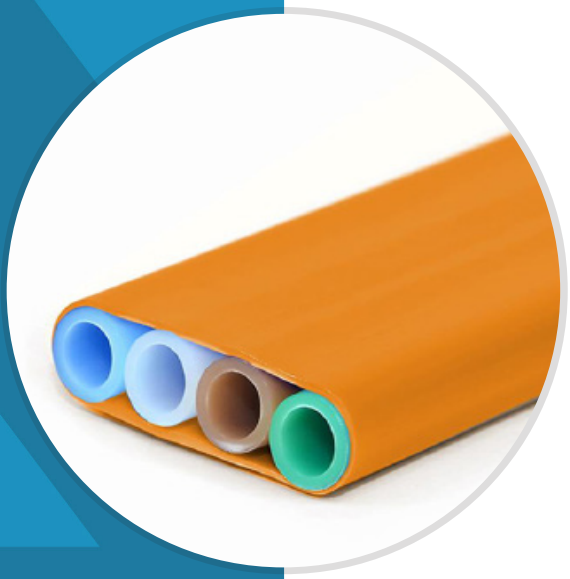


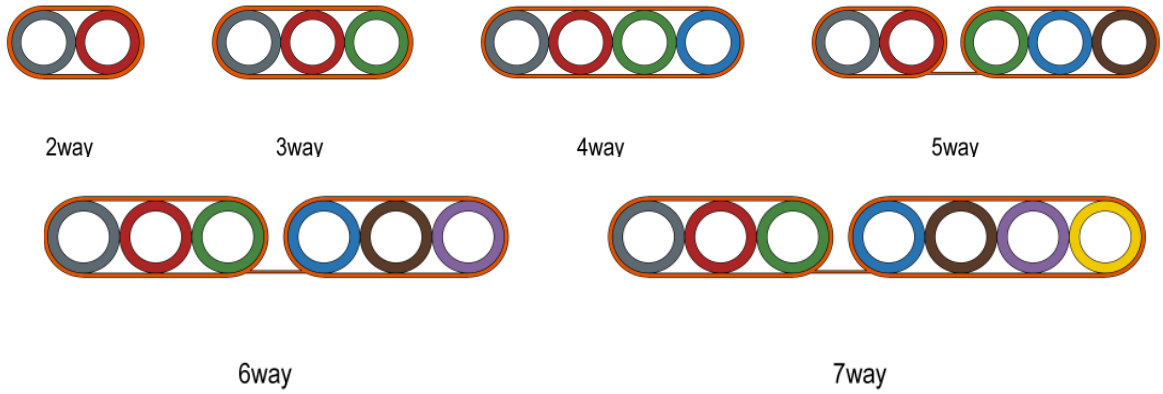
TUBE BUNDLE

AR-1FLAT-4DUCTS
20/16MM

1. PRODUCT DESCRIPTION

For micro-trenching with narrow width, AR-1FLAT-4DUCTS-20/16 MM is the most optimized item. The product itself can be placed vertically to fit on micro-trenching. The size of the product is relatively small which allows better shipping and handling with the smaller reel size. Since Flat Duct has the same thickness of TWD(Thick Walled Duct), customers can enjoy the same benefits of TWD

POSSIBLE COMBINATIONS



2. OPTIONAL FEATURES

- Various configurations with different size between 7/3.5mm and 20/16mm
- Wide range of number of inner tube from 1 way to 24+1 way
- Ribbed & Smooth Type
- Rip cords
- Insulated Locatable copper wire

3. MECHANICAL PERFORMANCE TEST COMPLIANCE

Tensile Strength	IEC 60794-1-2 Method E1
Bend	IEC 60794-1-2 Method E11
Kink	IEC 60794-1-2 Method E10
Impact	IEC 60794-1-2 Method E4
Crush	IEC 60794-1-2 Method E3

4. MATERIALS

	Test	Characteristic	Test Method	Acceptance Criteria
	1	**Bundles is manufactured with 100% virgin HDPE**		
	2	**Melt flow index**	ASTM 1238 190℃ @ 2.16KG Load	≤ 0.40 g/10min
	3	**Density**	ASTM D792	0.940～0.958 g/cm^3
	4	**Environmental stress crack resist (F50)**	ISO 4599	Min. 96h

Material	Marking	Color	Packing
HDPE Inner tube and Outer sheath	FT marking & Customized marking	Outer Sheath and Inner tube color can be customized	2500', 5000', 6500' / Steel Reel

4.1. APPLICATION

Item	Value
Installation temperature	-30 ºC ～ +50 ºC
Operation temperature	-40 ºC ～ +70 ºC
Storage temperature	-40°C ～ +70°C

5. PHYSICAL AND MECHANICAL PROPERTIES

5.1 INNER MICRO DUCT 20/16MM

Test	Characteristic	Test Method	Acceptance Criteria
1	Visual appearance	Visual inspection	Ribbed inside & smooth outside surface, free from blisters, shrink hole, flaking, scratches & roughness.
2	Outer diameter	YOFC	20.0mm ± 0.15mm
3	Wall thickness	YOFC	2.00 ± 0.10mm

4	Inner diameter clearance	Blowing steel ball	A 10.0mm steel ball can be blown freely through the duct.
5	Ovality	YOFC	≤ 5%
6	Pressurization	5 minutes @25 bar each duct	No damage and leakage
7	Kink	IEC 60794-1-2 Method E10	≤ 220mm
8	Tensile strength	Rate of extension: 100mm/min	≥ 2100N
9	Crush	Sample length: 250mm Load: 900N Duration of Max. load: 1 min Recovery time: 1 hour	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
10	Impact	IEC 60794-1-2 Method E4 1.5 J Impact, recovery time 1 hour	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
11	Heat reversion	110℃ ～ 23℃, 1 hour	≤ 3%
12	Min. bend radius	320mm	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
13	Co-efficient of Friction	750mm Diameter, 450°loop, 5kg mass	≤ 0.1
14	Color and printing	Visual inspection	As per customer specification

5.2. TUBE BUNDLES

Test	Characteristic	Test Method	Acceptance Criteria
1	Visual appearance	Visual inspection, Outer sheath: Black	Ribbed inside & smooth outside surface, free from blisters, shrink hole, flaking, scratches & roughness.
2	Outer diameter	YOFC	82.4mm*22.4mm (± 1.1mm)
3	Sheath Wall thickness	YOFC	1.20mm ± 0.20mm

4	Pressurization	5 minutes @25bar each duct	No damage and leakage
5	Tensile strength	Rate of extension: 100mm/min	≥ 6000N
6	Crush	Sample length: 250mm Load: 2000N Duration of Max. load: 1 min Recovery time: 1 hour	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
7	Impact	IEC 60794-1-2 Method E4 3.0J Impact, recovery time 1 hour	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
8	Min. bend radius	480mm	No residual deformation > 15% of inner and outer diameter, shall pass inner diameter clearance test.
9	Color and printing	Visual inspection	Orange or as per customer specification

Optical Fibres supplied in this specification meet the requirements of ITU-T G.652.D

6 .PRIMARY TUBES TECHNICAL DETAILS

6.1. DIMENSION

Item	Outer diameter(mm)		Inner diameter(mm)		Wall thickness(mm)		Pressure (bar/psi)
	Min	Max	Min	Max	Min	Silicon	
7/3.5	6.9	7.1	3.4	3.6	1.65	0.1	15/220
10/6	9.9	10.1	5.9	6.1	1.9	0.1	15/220
12/8	11.9	12.1	7.9	8.1	1.9	0.1	15/220
14/10	13.9	14.1	9.9	10.1	1.9	0.1	15/220
16/12	15.9	16.1	11.9	12.1	1.9	0.1	15/220
18/14	17.9	18.1	13.9	14.1	1.9	0.1	15/220
20/16	19.9	20.1	15.9	16.1	1.9	0.1	15/220

7. MICRODUCT ASSEMBLIES TECHNICAL DETAILS

7.1. TECHNICAL DETAILS

7/3.5mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	0.63	0.35	0.039	0.062	4	6	7	13	322
3way	0.91	0.35	0.039	0.091	4	9	7	18	468
4way	1.17	0.34	0.031	0.109	3	12	7	23	562
5way	1.62	0.34	0.031	0.141	3	16	7	32	728
6way	1.9	0.34	0.031	0.166	3	19	7	38	860
7way	2.17	0.34	0.031	0.192	3	22	7	43	991

10/6mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	0.87	0.47	0.039	0.1	5	9	9	17	516
3way	1.26	0.47	0.039	0.145	5	13	9	25	749
4way	1.64	0.46	0.031	0.177	5	16	9	33	915
5way	2.21	0.46	0.031	0.228	5	22	9	44	1179
6way	2.61	0.46	0.031	0.271	5	26	9	52	1397
7way	3	0.46	0.031	0.313	5	30	9	60	1615

12/8mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	1.02	0.55	0.039	0.122	6	10	11	20	631
3way	1.5	0.55	0.039	0.178	6	15	11	30	919
4way	1.95	0.54	0.031	0.219	5	20	11	39	1130
5way	2.61	0.54	0.031	0.282	5	26	11	52	1456
6way	3.08	0.54	0.031	0.334	5	31	11	62	1726
7way	3.55	0.54	0.031	0.387	5	36	11	71	1997

14/10mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	1.18	0.63	0.039	0.145	6	12	13	24	749
3way	1.73	0.63	0.039	0.211	6	17	13	35	1092
4way	2.27	0.61	0.031	0.26	6	23	12	45	1345
5way	3.00	0.61	0.031	0.335	6	30	12	60	1730
6way	3.55	0.61	0.031	0.397	6	36	12	71	2052
7way	4.1	0.61	0.031	0.46	6	41	12	82	2374

16/12mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	1.34	0.71	0.039	0.168	7	13	14	27	749
3way	1.97	0.71	0.039	0.244	7	20	14	39	1092
4way	2.58	0.69	0.031	0.301	7	26	14	52	1345
5way	3.39	0.69	0.031	0.388	7	34	14	68	1730
6way	4.02	0.69	0.031	0.461	7	40	14	80	2052
7way	4.65	0.69	0.031	0.533	7	47	14	93	2374

18/14mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	1.5	0.79	0.039	0.19	8	15	16	30	981
3way	2.2	0.79	0.039	0.278	8	22	16	44	1435
4way	2.90	0.71	0.031	0.343	8	29	15	58	1771
5way	3.79	0.71	0.031	0.441	8	38	15	76	2277
6way	4.5	0.71	0.031	0.524	8	45	15	90	2704
7way	5.21	0.71	0.031	0.606	8	52	15	104	3130

20/16mm	OD max (inch)	OD min (inch)	Sheath Thickness (inch)	Weight (lbs)	Supported Min. Bend Radius (in.)	Supported Max. Bend Radius (in.)	Unsupported Bend Min. Radius (min. in)	Unsupported Bend Max. Radius (min. in)	Safe Working Pull Strength(lbs)
2way	1.65	0.87	0.039	0.212	9	17	17	33	1095
3way	2.44	0.87	0.039	0.31	9	24	17	49	1601
4way	3.21	0.85	0.031	0.383	9	32	17	64	1979
5way	4.18	0.85	0.031	0.494	9	42	17	84	2551
6way	4.97	0.85	0.031	0.586	9	50	17	99	3026
7way	5.76	0.85	0.031	0.679	9	58	17	115	3504

INTERNATIONALLY CERTIFIED

ARTIC has met and maintains the rigorous standards required to become a Certified ISO 9001, ISO 14001 and TL9000 manufacturer. ARTIC microduct assemblies has been rigorously tested by Telcordia Technologies and found to be compliant to Telcordia GR-3155- CORE.