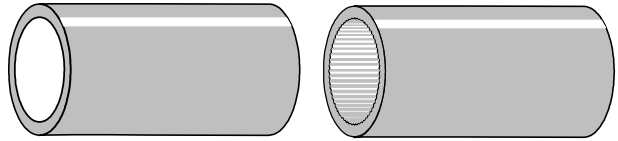


PRIME HDPE DUCT (or 'sub-duct')**1 GENERAL**

- 1.1 This document defines single continuous duct made from high quality HDPE, according to paragraph 2.1. It features a bonded low friction dry liner, to enable easy placement of fibre optic and power cables of suitable OD.
- 1.2 HDPE duct is supplied in coils or on returnable drums (wood or metal)
- 1.3 The finished product shall be free from cracks, holes, foreign inclusions or other defects that would impair its performance. It shall be smooth walled inside and out and conform to the requirements of this document. A ribbed internal surface is available on request.
- 1.4 The finished product shall be capped ensuring the ends are watertight to prevent the ingress of contamination or foreign bodies likely to cause problems when cabling.
- 1.5 Duct is available with a standard 8kN pull-rope pre-installed. This may be called 'rope-in-duct'.

2 RAW MATERIALS

- 2.1 The duct shall be extruded from pipe grade, virgin high density polyethylene compound in accordance with BS 3412: 1992 Class N. The tensile strength stated by the supplier shall be no less than 25MPa.
- 2.2 The derived density of the polyethylene shall be not less than 0.95 g/ml when determined in accordance with Appendix B of BS 3412 Method B5.
- 2.3 The melt flow rate of the polyethylene compound shall be less than 0.4g/600s when measured in accordance with ISO 1133 Method 720 Test condition 4.
- 2.4 The polyethylene shall be uniform in colour and free from foreign matter.
- 2.5 Both the polyethylene compound and the dry lubricant shall be protected against thermal degradation such that adequate stabilisation is imparted during processing of the material.
- 2.6 The polyethylene compound shall be adequately protected against ultraviolet degradation in accordance with ISO 877: Method 550B, normal daylight. Performance is based on maximum 6 months storage outdoors.
- 2.7 The polyethylene compound shall have a stated resistance to environmental stress cracking (ESCR) of no less than 500 hours according to ASTM D 1693 (10% CO-630, F50)

3 DIMENSIONS

- 2.8 The duct shall have dimensions (mm) as per the table below.
- 2.9 The ovality shall not exceed 3% (ducts up to OD 40mm). Ovality is the amount the greatest diameter exceeds the diameter at 90° to it, divide by the average diameter. It is expressed as a percentage. For ducts over nominal 40mm, the ovality shall be 5% max.
- 3.3 The weight (mass) of the duct shall be nominally as stated in the table.



'SIZE' OD/ID	SDR	MEAN OUTSIDE DIAM			I.D. nom	WALL THICKNESS			MASS nom g/m	max install tension	
		min	NOM	max		min	NOM	max		kN	kg
16 / 10	5.3	15.8	16	16.2	10	2.8	3.0	3.2	119	1.2	120
16 / 12	8.0	15.8	16	16.2	12	1.8	2.0	2.2	85	0.85	85
16 / 13	10.7	15.8	16	16.2	13	1.3	1.5	1.7	68	0.7	70
20 / 16	10.0	19.7	20	20.3	16	1.7	2.0	2.3	111	1.1	110
25 / 20	10.0	24.7	25	25.3	20	2.2	2.5	2.8	170	1.7	170
25 / 21	12.5	24.7	25	25.3	21	1.7	2.0	2.3	140	1.4	140
28 / 24	14.0	27.7	28	28.3	24	1.7	2.0	2.3	162	1.6	160
31 / 25	10.3	30.7	31	31.3	25	2.7	3.0	3.3	255	2.6	260
32 / 26	10.7	31.7	32	32.3	26	2.7	3.0	3.3	255	2.6	260
32 / 27	12.8	31.7	32	32.3	27	2.2	2.5	2.8	221	2.2	220
32 / 28	16.0	31.7	32	32.3	28	1.7	2.0	2.3	179	1.8	180
34 / 28	11.3	33.7	34	34.3	28	2.7	3.0	3.3	272	2.7	270
35 / 28	10.0	34.7	35	35.3	28	3.2	3.5	3.8	332	3.3	330
35 / 30	14.0	34.7	35	35.3	30	2.2	2.5	2.8	247	2.5	250
37 / 31	12.3	36.7	37	37.3	31	2.7	3.0	3.3	304	3	300
37 / 32	14.8	36.7	37	37.3	32	2.2	2.5	2.8	255	2.5	250
37 / 33	18.5	36.7	37	37.3	33	1.7	2.0	2.3	209	2	200
38 / 32	12.7	37.7	38	38.3	32	2.7	3.0	3.3	323	3.2	320
40 / 32	10.0	39.7	40	40.3	32	3.7	4.0	4.3	425	4.3	430
40 / 33	11.4	39.7	40	40.3	33	3.2	3.5	3.8	383	3.7	370
40 / 34	13.3	39.7	40	40.3	34	2.7	3.0	3.3	332	3.3	330
40 / 35	16.0	39.7	40	40.3	35	2.2	2.5	2.8	280	2.7	270
44 / 38	14.7	43.7	44	44.3	38	2.7	3.0	3.3	366	3.7	370
50 / 41	10.9	49.5	50	50.5	40.8	4.3	4.6	4.9	612	6.1	610
50 / 42	13.5	49.5	50	50.5	42.6	3.4	3.7	4.0	544	5.4	540
50 / 43	14.3	49.5	50	50.5	43	3.2	3.5	3.8	1943	19	1900
63 / 50	9.7	62.7	63	63.3	50	6.2	6.5	6.8	1105	11	1100

↳ 'SDR' is the standard dimension ratio (OD / wall). Lower SDRs indicate heavy-duty sizes.

4 PERFORMANCE

4.1 TENSILE: The duct shall withstand the stated axial load when applied at 100mm/min to a 500mm gauge length. The elongation due to this load shall not exceed 5%.

The expected tensile 'yield' load causes total failure of the duct. 'Yield' load is not a safe working load. At this load, the duct has normally elongated by around 10%, and then continues to elongate to failure.

4.2 INSTALLATION: We recommend that installation tension does not exceed that specified in the previous table, and that correct installation procedures are followed. Pulling duct causes temporary elongation, which reduces when unloaded. After pulling and before cutting or connecting the duct, allow suitable relaxation time, ideally 24 hours or more.

4.3 STIFFNESS of each duct at 5% deflection shall exceed that stated below. (Test to ASTM 2412)

4.4 COMPRESSION: The load expected to give 15% deflection on a 200mm length is given. (to EN 50086-2-4)

4.5 IMPACT: All duct shall withstand (ie no cracks) a 15J impact at -5°C when tested to EN 50086-2-4.

4.6 COIL SET: When 50m of duct is laid out and allowed to relax, the central part, excluding ends, shall lie substantially straight.

4.7 FRICTION: The frictional force (horizontal) on a standard pull-rope shall be no greater than 390N when lifting a 25kg mass (vertical) at a speed of 0.5m/min. The duct sample containing the rope shall be 5m long, and include a 450° loop of diameter 0.75m.

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4.8 BENDING: Minimum recommended bend radius is as stated. If temp is below 5°C, MBR is greater, as stated. Do not go tighter than the MBR. Remember that the **greater** the installed bend radius, the less stress will be induced in the duct, and the easier that cables will blow or pull around the curve.

**Barrel diameters for supply may be slightly tighter than this.

OD / ID	4.1 tensile test load (N)	4.1 expected tensile yield load (N) #	4.3 min stiffness ASTM 2412 kPa	4.4 expected load at 15% compression on 200mm length		4.8 Min bend radius** for handling and lifetime configuration	
				Newtons	kg	over 5°C	under 5°C
16 / 10	1400	2810				0.16m	0.22m
16 / 12	1000	2020				0.16m	0.22m
16 / 13	800	1570				0.19m	0.27m
20 / 16	1300	2600				0.22m	0.3m
25 / 20	2000	4060	3000	1900	190	0.3m	0.4m
25 / 21	1650	3300		950	95	0.35m	0.5m
28 / 24	1900	3750				0.45m	0.65m
31 / 25	3000	6070	2500	1800	180	0.35m	0.5m
32 / 26	3000	6280	2100	1600	160	0.4m	0.55m
32 / 27	2600	5320	1500	1200	120	0.45m	0.65m
32 / 28	2100	4330	900	800	80	0.55m	0.75m
34 / 28	3200	6720	2000	1600	160	0.45m	0.55m
35 / 28	3900	7960	2500	2500	250	0.4m	0.55m
35 / 30	2900	5870				0.55m	0.80m
37 / 31	3600	7200				0.5m	0.7m
37 / 32	3000	6230	1000	1000	100	0.6m	0.85m
37 / 33	2400	5000				0.7m	1.0m
38 / 32	3800	7500				0.53m	0.75m
40 / 32	5000	10400	2800	2800	280	0.45m	0.65m
40 / 33	4500	9230	1800	1700	170	0.5m	0.7m
40 / 34	3900	8000				0.56m	0.8m
40 / 35	3200	6700				0.7m	1.0m
44 / 38	4300	8800				0.7m	1.0m
50 / 41	7200	14790	2200	2800	280	0.55m	0.8m
50 / 42	6400	13290	1200	1600	160	0.75m	1.05m
50 / 43	6000	11700				0.75m	1.05m
63 / 50	13000	26500				0.7m	1.0m

NOTE: Emtelle can supply additional sizes. Please enquire.

4.9 MARKING: Unless otherwise requested, the duct shall be marked as below at one metre intervals:

Incremental metre-mark
 Manufacturer's product code
 Production date
 Size of duct
 Customer name and / or other special designations
 (Colours and / or stripes are also available on request)



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