5. Halogen free

- Certain equipment with normal flame retardant or fire resistant cable only retards or resists fire but it would release toxic and poisonous gases when its electric wires and cables caught fire. The use of *FiRLL* Fire Resistant Cables however ensure high degree of safety in public, commercial and industrial environments as *FiRLL* Fire Resistant Cables compose of non-halogenated materials as well as they do not release corrosive and acidic gases such as HCL or CO etc. [comply with IEC60754-1 and IEC60754-2]. Only non-corrosive and non-acidic gases are emitted during fire and therefore *FiRLL* Fire Resistant Cables reduce threat to damage and reduce risks to hamper the performance of emergency systems and human lungs. Using *FiRLL* Fire Resistant Cables can thus prevent losses of human lives and increase chances of survivor when fire breaks out. *FiRLL* Fire Resistant Cables are most suitable for installation in public areas such as hospital, airport, theatre, shopping complex, stadium, tunnel, subway and special industrial environment such as power station etc.

6. Ease of installation

- The installation of *FiRLL* Fire Resistant Cables is similar to normal installation of wires and cables. *FiRLL* Fire Resistant Cables are durable and flexible enough to be pulled into conduit and trunking during installation. *FiRLL* Fire Resistant Cables are ideal to update existing emergency devices such as alarm and lighting systems previously wired using PVC cables in existing conduit or trunking in the public, commercial and industrial environments.

7. RoHS

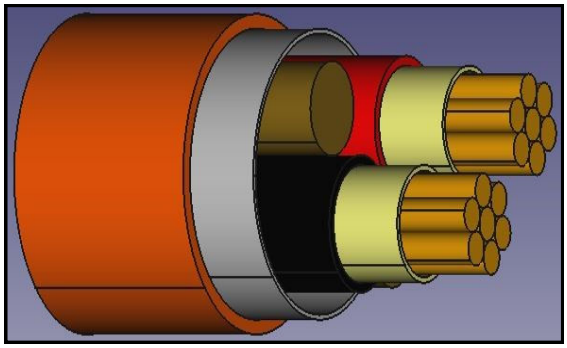
- Traditional PVC cables which contain lead will cause environmental issues when disposed improperly. *FiRLL* Fire Resistant Cables are non-lead cables and can comply with European RoHS Directive (Restriction of Hazardous Substances). *FiRLL* Fire Resistant Cables do not contain hazardous substances such as cadmium, lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs).

8. Special sheathing requirements

- *FiRLL* Fire Resistant Cables use special mica based fire-resistant tape which is non-toxic, halogen-free as its primary insulation layer. Secondary insulation and sheathing materials of *FiRLL* Fire Resistant Cables can be special grade of thermoplastic or thermoset low smoke, halogen-free, flame retardant materials. Anti-termite sheathing or anti-rodent sheathing or UV protection sheathing or higher flame retardant sheathing is available upon request.

Construction of Cable: 600/1000V Non-Armoured Fire Resistant Cable

Drawing:



Application:

Non-armoured *FiRLL* Fire Resistant Cables are for general application in power and signal wirings where mechanical damages are not to be expected, not only for emergency circuits but for areas where maintaining circuit integrity and/ or control of fire spread are deemed desirable. With a high level of fire resistance, the cables are durable and flexible enough to be pulled into conduit and trunking, and are the cost effective alternative to standard cable wiring systems. Due to its low smoke halogen free compound which ensures flame retardant, low toxicity and acidic gases and smoke emission, the cables increase chances of survival during fire breakout and are ideal for installation in existing metal conduit or trunking to update existing alarm and lighting systems previously wired in PVC cables in the public, commercial and industrial environments. The cables are RoHS compliance and are suitable for operation at a maximum conductor temperature of 90°C.

NO.	DESCRIPTION	LSHF Insulated LSHF Sheathed
1	Conductor	Circular stranded or circular compact stranded plain annealed copper wire according to IEC60228 class 2
2	Flame barrier layer	Mica based fire resistant tape
3	Identification of cores: Single core – Natural Two cores – Red and Black Three cores – Red, Yellow and Blue Four cores – Red, Yellow, Blue and Black Five cores and above: Number 1, 2, 3, 4, 5… and the number shall be blue or black printed on White cores.	Low smoke halogen free (LSHF) compound
4	Laying Up	Cores stranded together. Binder tape and non-hygroscopic filler may be applied where necessary
5	Outer sheath shall be orange	LSHF compound
TECHNICAL DATA		
1	Voltage	600/1000V
2	Maximum Conductor Temperature	90°C
3	Reference	BS6387 IEC60502-1
4	Testing Voltage	3500V
5	Minimum Bending Radius	8 X Bending Radius

600/1000V LSHF Insulated LSHF Sheathed Non-Armoured Fire Resistant Cable

No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conductor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
1	1.5	7/0.53	0.7	1.4	7.3	76	12.1	13	0.17
	2.5	7/0.67	0.7	1.4	7.8	91	7.41	11	0.29
	4	7/0.85	0.7	1.4	8.3	113	4.61	10	0.46
	6	7/1.04	0.7	1.4	8.9	139	3.08	9	0.69
	10	Compact round stranded	0.7	1.4	9.6	188	1.83	8	1.15
	16		0.7	1.4	10.6	257	1.15	6	1.85
	25		0.9	1.4	12.1	369	0.727	6	2.89
	35		0.9	1.4	13.2	478	0.524	5	4.04
	50		1.0	1.4	14.5	615	0.387	5	5.77
	70		1.0	1.4	15.9	832	0.268	5	8.08
	95		1.1	1.5	18.3	1124	0.193	5	10.96
	120		1.2	1.5	20.0	1388	0.153	5	13.85
	150		1.4	1.6	22.0	1694	0.124	5	17.31
	185		1.6	1.6	24.2	2094	0.0991	5	21.35
	240		1.7	1.7	26.9	2718	0.0754	5	27.70
	300		1.8	1.8	29.6	3365	0.0601	5	34.62
	400		2.0	1.9	33.0	4257	0.0470	5	46.16
	500		2.2	2.0	36.5	5314	0.0366	5	57.70
	630	127/2.52	2.4	2.2	40.9	6856	0.0283	5	72.70
2	1.5	7/0.53	0.7	1.8	12.6	168	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	13.4	200	7.41	11	0.29
	4	7/0.85	0.7	1.8	14.5	248	4.61	10	0.46
	6	7/1.04	0.7	1.8	15.6	305	3.08	9	0.69
	10	Compact round stranded	0.7	1.8	17.2	410	1.83	8	1.15
	16		0.7	1.8	19.2	556	1.15	6	1.85
	25		0.9	1.8	22.2	795	0.727	6	2.89
	35		0.9	1.8	24.4	1028	0.524	5	4.04
	50		1.0	1.8	26.8	1316	0.387	5	5.77
	70		1.1	1.8	30.2	1793	0.268	5	8.08
	95		1.1	1.9	34.4	2394	0.193	5	10.96
	120		1.2	2.0	38.0	2971	0.153	5	13.85
	150		1.4	2.2	42.0	3636	0.124	5	17.31
	185		1.6	2.3	46.6	4505	0.0991	5	21.35
	240		1.7	2.5	52.0	5851	0.0754	5	27.70
	300		1.8	2.6	57.2	7221	0.0601	5	34.62

600/1000V LSHF Insulated LSHF Sheathed Non-Armoured Fire Resistant Cable

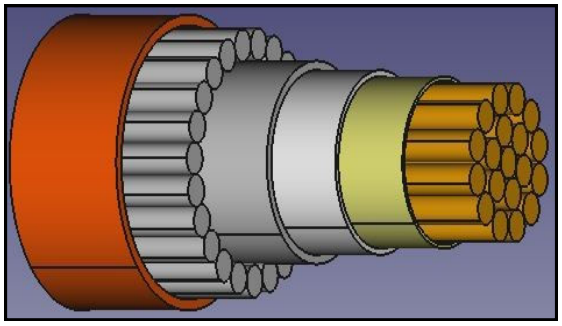
No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conductor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
3	1.5	7/0.53	0.7	1.8	13.2	198	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	14.1	241	7.41	11	0.29
	4	7/0.85	0.7	1.8	15.3	306	4.61	10	0.46
	6	7/1.04	0.7	1.8	16.5	386	3.08	9	0.69
	10	Compact round stranded	0.7	1.8	18.2	535	1.83	8	1.15
	16		0.7	1.8	20.4	743	1.15	6	1.85
	25		0.9	1.8	23.6	1079	0.727	6	2.89
	35		0.9	1.8	26.0	1414	0.524	5	4.04
	50		1.0	1.8	28.6	1828	0.387	5	5.77
	70		1.1	1.9	32.4	2533	0.268	5	8.08
	95		1.1	2.0	36.9	3404	0.193	5	10.96
	120		1.2	2.1	40.8	4235	0.153	5	13.85
	150		1.4	2.3	45.1	5179	0.124	5	17.31
	185		1.6	2.4	50.0	6426	0.0991	5	21.35
	240		1.7	2.6	55.8	8375	0.0754	5	27.70
	300		1.8	2.7	61.4	10366	0.0601	5	34.62
4	1.5	7/0.53	0.7	1.8	14.4	256	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	15.4	314	7.41	11	0.29
	4	7/0.85	0.7	1.8	16.7	401	4.61	10	0.46
	6	7/1.04	0.7	1.8	18.0	508	3.08	9	0.69
	10	Compact round stranded	0.7	1.8	19.9	706	1.83	8	1.15
	16		0.7	1.8	22.3	984	1.15	6	1.85
	25		0.9	1.8	26.0	1441	0.727	6	2.89
	35		0.9	1.8	28.6	1890	0.524	5	4.04
	50		1.0	1.8	31.5	2449	0.387	5	5.77
	70		1.1	2.0	36.0	3412	0.268	5	8.08
	95		1.1	2.1	41.0	4577	0.193	5	10.96
	120		1.2	2.3	45.6	5716	0.153	5	13.85
	150		1.4	2.4	50.1	6968	0.124	5	17.31
	185		1.6	2.6	55.8	8683	0.0991	5	21.35
	240		1.7	2.8	62.2	11297	0.0754	5	27.70
	300		1.8	3.0	68.7	14007	0.0601	5	34.62

600/1000V LSHF Insulated LSHF Sheathed Non-Armoured Fire Resistant Cable

No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conductor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
5	1.5	7/0.53	0.7	1.8	15.6	303	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	16.7	374	7.41	11	0.29
	4	7/0.85	0.7	1.8	18.2	482	4.61	10	0.46
	6	7/1.04	0.7	1.8	19.7	613	3.08	9	0.69
	10	Compact round stranded	0.7	1.8	21.8	859	1.83	8	1.15
	16		0.7	1.8	24.5	1204	1.15	6	1.85
	25		0.9	1.8	28.6	1770	0.727	6	2.89
	35		0.9	1.8	31.6	2328	0.524	5	4.04
	50		1.0	1.9	35.0	3040	0.387	5	5.77
	70		1.1	2.1	40.0	4236	0.268	5	8.08
	95		1.1	2.2	45.6	5686	0.193	5	10.96
	120		1.2	2.4	50.6	7100	0.153	5	13.85
7	1.5	7/0.53	0.7	1.8	16.9	386	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	18.2	483	7.41	11	0.29
	4	7/0.85	0.7	1.8	19.8	630	4.61	10	0.46
10	1.5	7/0.53	0.7	1.8	21.2	534	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	22.9	673	7.41	11	0.29
	4	7/0.85	0.7	1.8	25.1	861	4.61	10	0.46
12	1.5	7/0.53	0.7	1.8	21.9	612	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	23.6	776	7.41	11	0.29
	4	7/0.85	0.7	1.8	25.9	1022	4.61	10	0.46
19	1.5	7/0.53	0.7	1.8	25.6	901	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	27.7	1154	7.41	11	0.29
	4	7/0.85	0.7	1.8	30.4	1538	4.61	10	0.46
27	1.5	7/0.53	0.7	1.8	30.6	1235	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	33.2	1592	7.41	11	0.29
	4	7/0.85	0.7	1.8	36.5	2132	4.61	10	0.46
37	1.5	7/0.53	0.7	1.8	34.2	1630	12.1	13	0.17
	2.5	7/0.67	0.7	1.8	37.2	2113	7.41	11	0.29
	4	7/0.85	0.7	1.9	41.2	2865	4.61	10	0.46
48	1.5	7/0.53	0.7	1.8	39.2	2072	12.1	13	0.17
	2.5	7/0.67	0.7	1.9	42.9	2716	7.41	11	0.29
	4	7/0.85	0.7	2.1	47.7	3709	4.61	10	0.46

Construction of Cable: 600/1000V Armoured Fire Resistant Cable

Drawing:



Application:

Armoured *FiRLL* Fire Resistant Cables offer the advantages of an armoured 600/1000V rated, low smoke halogen free cable and are for general application in power and signal wirings, not only for emergency circuits but for areas where maintaining circuit integrity and/or control of fire spread are deemed desirable. Due to its low smoke halogen free compound which ensures flame retardant, low toxicity and acidic gases and smoke emission, the cables increase chances of survival during fire breakout. The cables are suitable for use in public, commercial and industrial environments where maintaining life, equipment and structures are critical. The cables are RoHS compliance and are suitable for continuous operation at a maximum conductor temperature of 90ºC.

NO.	DESCRIPTION	LSHF Insulated LSHF Sheathed
1	Conductor	Circular stranded or circular compact plain annealed copper wire according to IEC60228 class 2
2	Flame barrier layer	Mica based fire resistant tape
3	Identification of cores: Single core – Natural Two cores – Red and Black Three cores – Red, Yellow and Blue Four cores – Red, Yellow, Blue and Black Five cores and above: Number 1, 2, 3, 4, 5… and the number shall be blue or black printed on White cores.	Low smoke halogen free (LSHF) compound
4	Laying Up	Cores stranded together. Binder tape and non-hygroscopic filler may be applied where necessary
5	Separation sheath shall be natural	LSHF compound
6	Armour	Single core – single layer of non-magnetic material eg aluminium wire Two core and above – single layer of galvanized steel wire
7	Outer sheath shall be orange	LSHF compound
TECHNICAL DATA		
1	Voltage	600/1000V
2	Maximum Conductor Temperature	90ºC
3	Reference	BS6387 IEC60502-1
4	Testing Voltage	3500V
5	Minimum Bending Radius	8 X Bending Radius

600/1000V LSHF Insulated LSHF Sheathed Armoured Fire Resistant Cable

No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of bedding	Nominal armour wire diameter	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conduc-tor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
1	70	Compact round stranded	1.0	1.0	1.25	1.8	21.4	1110	0.268	5	8.08
	95		1.1	1.0	1.25	1.8	23.6	1426	0.193	5	10.96
	120		1.2	1.0	1.60	1.8	26.0	1769	0.153	5	13.85
	150		1.4	1.0	1.60	1.8	27.8	2094	0.124	5	17.31
	185		1.6	1.0	1.60	1.8	30.0	2536	0.0991	5	21.35
	240		1.7	1.0	1.60	1.9	32.7	3207	0.0754	5	27.70
	300		1.8	1.0	1.60	1.9	35.2	3883	0.0601	5	34.62
	400		2.0	1.2	2.00	2.1	40.0	4980	0.0470	5	46.16
	500		2.2	1.2	2.00	2.2	43.5	6108	0.0366	5	57.70
	630	127/2.52	2.4	1.2	2.00	2.3	47.7	7725	0.0283	5	72.70
2	1.5	7/0.53	0.7	1.0	0.90	1.8	16.6	454	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	0.90	1.8	17.4	507	7.41	11	0.29
	4	7/0.85	0.7	1.0	0.90	1.8	18.5	575	4.61	10	0.46
	6	7/1.04	0.7	1.0	0.90	1.8	19.6	660	3.08	9	0.69
	10	Compact round stranded	0.7	1.0	1.25	1.8	21.9	921	1.83	8	1.15
	16		0.7	1.0	1.25	1.8	23.9	1129	1.15	6	1.85
	25		0.9	1.0	1.60	1.8	27.6	1608	0.727	6	2.89
	35		0.9	1.0	1.60	1.8	29.8	1918	0.524	5	4.04
	50		1.0	1.0	1.60	1.8	32.2	2301	0.387	5	5.77
	70		1.1	1.0	1.60	2.0	36.0	2946	0.268	5	8.08
	95		1.1	1.2	2.00	2.1	41.4	4010	0.193	5	10.96
	120		1.2	1.2	2.00	2.2	45.0	4769	0.153	5	13.85
	150		1.4	1.2	2.00	2.3	48.8	5573	0.124	5	17.31
	185		1.6	1.4	2.50	2.5	55.0	7220	0.0991	5	21.35
	240		1.7	1.4	2.50	2.7	60.4	8856	0.0754	5	27.70

600/1000V LSHF Insulated LSHF Sheathed Armoured Fire Resistant Cable

No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of bedding	Nominal armour wire diameter	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conductor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
3	1.5	7/0.53	0.7	1.0	0.90	1.8	17.2	498	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	0.90	1.8	18.1	562	7.41	11	0.29
	4	7/0.85	0.7	1.0	0.90	1.8	19.3	654	4.61	10	0.46
	6	7/1.04	0.7	1.0	0.90	1.8	20.5	766	3.08	9	0.69
	10	Compact round stranded	0.7	1.0	1.25	1.8	22.9	1072	1.83	8	1.15
	16		0.7	1.0	1.25	1.8	25.1	1352	1.15	6	1.85
	25		0.9	1.0	1.60	1.8	29.0	1948	0.727	6	2.89
	35		0.9	1.0	1.60	1.8	31.4	2362	0.524	5	4.04
	50		1.0	1.0	1.60	1.9	34.2	2889	0.387	5	5.77
	70		1.1	1.2	2.00	2.0	39.2	4039	0.268	5	8.08
	95		1.1	1.2	2.00	2.2	43.9	5144	0.193	5	10.96
	120		1.2	1.2	2.00	2.3	47.8	6159	0.153	5	13.85
	150		1.4	1.4	2.50	2.5	53.5	7800	0.124	5	17.31
	185		1.6	1.4	2.50	2.6	58.4	9332	0.0991	5	21.35
	240		1.7	1.6	2.50	2.8	64.6	11671	0.0754	5	27.70
4	1.5	7/0.53	0.7	1.0	0.90	1.8	18.4	583	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	0.90	1.8	19.4	667	7.41	11	0.29
	4	7/0.85	0.7	1.0	0.90	1.8	20.7	782	4.61	10	0.46
	6	7/1.04	0.7	1.0	1.25	1.8	22.7	1044	3.08	9	0.69
	10	Compact round stranded	0.7	1.0	1.25	1.8	24.7	1304	1.83	8	1.15
	16		0.7	1.0	1.60	1.8	27.7	1798	1.15	6	1.85
	25		0.9	1.0	1.60	1.8	31.4	2389	0.727	6	2.89
	35		0.9	1.0	1.60	1.9	34.2	2967	0.524	5	4.04
	50		1.0	1.0	1.60	2.0	37.3	3643	0.387	5	5.77
	70		1.1	1.2	2.00	2.2	43.0	5119	0.268	5	8.08
	95		1.1	1.2	2.00	2.3	48.0	6503	0.193	5	10.96
	120		1.2	1.4	2.50	2.5	54.0	8341	0.153	5	13.85
	150		1.4	1.4	2.50	2.6	58.5	9875	0.124	5	17.31
	185		1.6	1.4	2.50	2.8	64.2	11923	0.0991	5	21.35
	240		1.7	1.6	2.50	3.0	71.0	14980	0.0754	5	27.70

600/1000V LSHF Insulated LSHF Sheathed Armoured Fire Resistant Cable

No. of cores	Nominal cross-sectional area	Number/ Diameter of wires	Thickness of insulation	Thickness of bedding	Nominal armour wire diameter	Thickness of sheath	Approx. overall diameter	Approx. net weight	Max conductor resistance at 20°C	Min insulation resistance at 20°C	Short circuit current for 1 sec.
	(mm^2)	(No./mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg/km)	(Ω/KM)	(MΩ-KM)	(kA)
5	1.5	7/0.53	0.7	1.0	0.90	1.8	19.6	657	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	0.90	1.8	20.7	755	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.25	1.8	22.9	1018	4.61	10	0.46
	6	7/1.04	0.7	1.0	1.25	1.8	24.4	1198	3.08	9	0.69
	10	Compact round stranded	0.7	1.0	1.25	1.8	26.5	1505	1.83	8	1.15
	16		0.7	1.0	1.60	1.8	29.9	2111	1.15	6	1.85
	25		0.9	1.0	1.60	1.8	34.0	2814	0.727	6	2.89
	35		0.9	1.0	1.60	1.9	37.2	3505	0.524	5	4.04
	50		1.0	1.2	2.00	2.1	42.0	4686	0.387	5	5.77
	70		1.1	1.2	2.00	2.3	47.0	6103	0.268	5	8.08
	95		1.1	1.4	2.50	2.5	54.2	8375	0.193	5	10.96
	120		1.2	1.4	2.50	2.6	59.0	10051	0.153	5	13.85
7	1.5	7/0.53	0.7	1.0	0.90	1.8	20.9	773	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.25	1.8	22.9	1020	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.25	1.8	24.5	1215	4.61	10	0.46
10	1.5	7/0.53	0.7	1.0	1.25	1.8	26.6	1308	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.25	1.8	28.3	1505	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.60	1.8	30.5	1807	4.61	10	0.46
12	1.5	7/0.53	0.7	1.0	1.25	1.8	27.3	1406	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.25	1.8	29.0	1645	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.60	1.8	31.3	1970	4.61	10	0.46
19	1.5	7/0.53	0.7	1.0	1.25	1.8	31.0	1846	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.60	1.8	33.1	2177	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.60	1.8	35.8	2657	4.61	10	0.46
27	1.5	7/0.53	0.7	1.0	1.60	1.8	36.0	2356	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.60	1.8	38.6	2809	7.41	11	0.29
	4	7/0.85	0.7	1.0	1.60	1.9	42.1	3502	4.61	10	0.46
37	1.5	7/0.53	0.7	1.0	1.60	1.8	39.6	2902	12.1	13	0.17
	2.5	7/0.67	0.7	1.0	1.60	1.9	42.8	3503	7.41	11	0.29
	4	7/0.85	0.7	1.2	2.00	2.1	48.2	4813	4.61	10	0.46
48	1.5	7/0.53	0.7	1.0	1.60	1.9	45.6	3866	12.1	13	0.17
	2.5	7/0.67	0.7	1.2	2.00	2.1	49.9	4754	7.41	11	0.29
	4	7/0.85	0.7	1.2	2.00	2.2	54.5	5940	4.61	10	0.46