

SPECIFICATION**For****FD-0.6/1KV-CV-GRD**

0.6/1(1.2)kV

XLPE Insulated PVC Sheathed

Flame Retardant with Grounded Power Cable

(0.6/1(1.2)kV, Cu/XLPE/FR-PVC)

BY



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CUSTOMER

Rev.	Date	Description
0	09/09/2019	Issued specification
1	12/2/2020	Correct marking on cable
2	5/02/2021	Cancel cable code "0010"
3	1/04/2021	Add size 3+GRD x 240/95 mm ²
4	11/8/2021	Add size 4+GRD x 16/10 mm ²
5	24/8/2021	Add size 3+GRD x 240/25 mm ²
6	9/9/2021	Add size 3+GRD x 35/16 mm ²
7	10/9/2021	Add size 4+GRD x 185/35 mm ²
8	18/2/2022	Add size
9	4/7/2022	Add size 3+GRD x 70/35 mm ²
10	3/8/2022	Add size 2+GRD x 16/16 mm ² , 3+GRD x 10/10 and 16/16 mm ²
11	7/6/2023	Add size 4+GRD x 120/25 mm ²

Customer Document	Rev.

Remark:

This document is based on the Customer Document for the structure and properties of electric wire and cable only. If there are different points, will be shown in deviation table.

1. Scope

This specification covers 1000V copper conductor cross-linked polyethylene (XLPE) insulated polyvinyl chloride (PVC) sheathed flame retardant with grounded power cable.

The cable shall be in accordance with IEC 60502-1 : 2004 and Amend.1 : 2009.

The finished cables shall meet the vertical tray flame test requirements per IEC 60332-1 and IEC 60332-3-24; Category C.

2. Conductor

For size $\leq 6 \text{ mm}^2$:

The conductor shall be non-compacted concentric stranded uncoated annealed copper conductor in accordance with IEC 60228 : 2004, Class 2.

The direction of lay shall be left-hand (S) lay.

For size $\geq 10 \text{ mm}^2$:

The conductor shall be compacted concentric stranded uncoated annealed copper conductor in accordance with IEC 60228 : 2004, Class 2.

The direction of lay shall be left-hand (S) lay in the outermost layer.

3. Insulation

The insulation shall be cross-linked polyethylene (XLPE) compound meet the requirements of IEC 60502-1 : 2004.

The average thickness of the insulation shall be not less than that given in Table 1.

The minimum thickness shall not fall below the value in Table 1 by more than 10 % plus 0.1 mm.

4. Cabling

The individual insulated cores shall be cabled together with suitable non-hygroscopic filler to give the completed cable a substantially circular cross section.

The direction of lay shall be left-hand (S) lay.

A suitable binder tape shall be applied helically over the cabled core.

5. Core Identification

The cores shall be identified by color, as follows :

2-cores + GRD : blue, brown + green/yellow

3-cores + GRD : brown, black, grey + green/yellow

4-cores + GRD : blue, brown, black, grey + green/yellow

6. Sheath

The sheath shall be sunlight resistant and flame retardant polyvinyl chloride (PVC/ST2) compound meet the requirements of IEC 60502-1 : 2004.


The average thickness of the sheath shall be not less than that given in Table 1.

The minimum thickness shall not fall below the value in Table 1 by more than 20% plus 0.2 mm.

The color of the sheath shall be black.

7. Marking on Cable

The marking items shall be marked with suitable means throughout the length of cable.

1. Manufacturer's name and/or trade mark "  YAZAKI..... : TYE"
2. Year of manufacture
3. Flame retardant "FD"
4. Rated circuit voltage "0.6/1KV"
5. Type of insulation "XLPE"
6. Type of cable "POWER CABLE"
7. Number of cores and size of conductor
8. The continuous reel length marking (in figure) shall be made on the sheath at every 1 meter

8. Test and Properties

The cable shall meet the requirements in Test and Inspection and Table 1, when tested in accordance with IEC 60502-1 : 2004 and Amend.1 : 2009, IEC 60228 : 2004 and IEC 60332-3-24 ; Category C.


Remark: Sunlight resistant test meet the requirement of TIS 293-2541.

9. Packing

The cable shall be placed on non-returnable wooden reels.

The reels shall be covered with suitable covering to provide the cable with physical protection during transportation and during ordinary storage and handling operations.

Each reel shall be clearly marked as follows.

1. Designation "FD-0.6/1KV-CV-GRD"
2. Number of cores and size of conductor
3. Cable length
4. Net and gross weight
5. Manufacturer's name and/or trade mark "  YAZAKI "
6. Rolling direction of reel

Test and Inspection

Routine Tests

- Maximum conductor resistance, Ohm/km..... specified in Table 1
- AC test voltage for 5 minutes, kV..... 3.5

Sample Tests

- Construction..... specified in Table 1
- Hot set test at $200\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ for XLPE
 - Maximum elongation under load (%) 175
 - Maximum permanent elongation after cooling (%)..... 15

Type Tests

- Flame retardant tested according to IEC 60332-1 and IEC 60332-3-24; Category C.

Definition concerning the tests

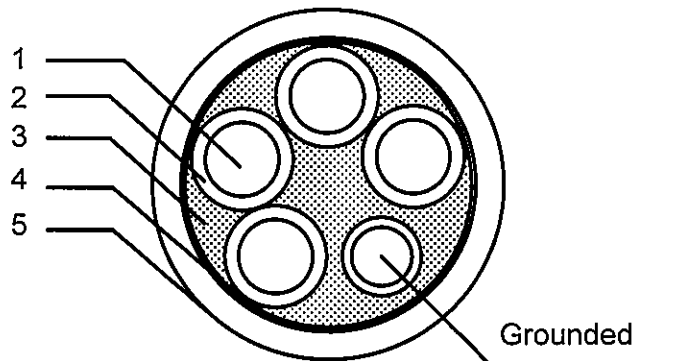
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

Sample tests: Tests made by the manufacturer on samples of completed cable or components taken from a completed cable, at a specified frequency, so as to verify that the finished product meets the specified requirements.

Type tests: Tests made before supplying, on a general commercial basis, a type of cable covered by this standard, in order to demonstrate satisfactory performance characteristics to meet the intended application.

Cable structure

Cross-sectional (Not scale)



No.	Structure	Material
1	Conductor	Stranded annealed copper
2	Insulation	Cross-linked polyethylene (XLPE)
3	Filler	Non-hygroscopic
4	Binder Tape	Spun bond tape or suitable tape
5	Sheath	Flame retardant polyvinyl chloride (ST2)

Application: Use for installation in open tray, conduit, underground duct trench or direct burial in ground, at wet or dry location. Maximum conductor temperature of 90°C for normal operation and 250°C for short circuit conditions.

Table 1

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
2+GRD x 1.5/1.5	7/Non-compacted	1.59	0.7	1.8	11.5	12.1	150	300
2+GRD x 2.5/1.5	7/Non-compacted	2.01	0.7	1.8	12.5	7.41	180	500
2+GRD x 2.5/2.5	7/Non-compacted	2.01	0.7	1.8	12.5	7.41	190	500
2+GRD x 4/2.5	7/Non-compacted	2.55	0.7	1.8	13.5	4.61	230	500
2+GRD x 4/4	7/Non-compacted	2.55	0.7	1.8	13.5	4.61	250	500
2+GRD x 6/2.5	7/Non-compacted	3.12	0.7	1.8	14.0	3.08	290	500
2+GRD x 6/4	7/Non-compacted	3.12	0.7	1.8	15.0	3.08	310	500
2+GRD x 10/2.5	7/Compacted	3.80	0.7	1.8	15.5	1.83	370	500
2+GRD x 10/4	7/Compacted	3.80	0.7	1.8	15.5	1.83	390	500
2+GRD x 10/6	7/Compacted	3.80	0.7	1.8	16.0	1.83	410	500
2+GRD x 16/4	7/Compacted	4.80	0.7	1.8	17.5	1.15	500	500
2+GRD x 16/6	7/Compacted	4.80	0.7	1.8	17.5	1.15	550	500
2+GRD x 16/10	7/Compacted	4.80	0.7	1.8	17.5	1.15	600	500
2+GRD x 16/16	7/Compacted	4.80	0.7	1.8	18.5	1.15	650	500
2+GRD x 25/2.5	7/Compacted	6.00	0.9	1.8	21.0	0.727	700	500
2+GRD x 25/6	7/Compacted	6.00	0.9	1.8	21.0	0.727	750	500
2+GRD x 25/10	7/Compacted	6.00	0.9	1.8	21.0	0.727	800	500
2+GRD x 35/10	7/Compacted	7.10	0.9	1.8	23.0	0.524	1000	500
2+GRD x 35/16	7/Compacted	7.10	0.9	1.8	23.5	0.524	1100	500
2+GRD x 50/6	19/Compacted	8.30	1.0	1.8	26.0	0.387	1200	500
2+GRD x 50/10	19/Compacted	8.30	1.0	1.8	26.0	0.387	1300	500
2+GRD x 50/16	19/Compacted	8.30	1.0	1.8	26.0	0.387	1300	500
2+GRD x 70/6	19/Compacted	9.90	1.1	1.8	29.5	0.268	1700	500
2+GRD x 70/10	19/Compacted	9.90	1.1	1.8	29.5	0.268	1700	500
2+GRD x 70/16	19/Compacted	9.90	1.1	1.8	29.5	0.268	1800	500
2+GRD x 95/16	19/Compacted	11.70	1.1	1.8	33.0	0.193	2300	500
2+GRD x 95/25	19/Compacted	11.70	1.1	1.8	33.5	0.193	2400	500
2+GRD x 120/16	37/Compacted	13.20	1.2	1.9	37.0	0.153	2900	500
2+GRD x 120/35	37/Compacted	13.20	1.2	1.9	37.0	0.153	3100	500
2+GRD x 150/25	37/Compacted	14.60	1.4	2.0	40.5	0.124	3600	500
2+GRD x 150/35	37/Compacted	14.60	1.4	2.0	41.0	0.124	3700	500
2+GRD x 150/50	37/Compacted	14.60	1.4	2.0	41.0	0.124	3800	500

Table 1 (continued)

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
2+GRD x 185/25	37/Compacted	16.30	1.6	2.1	45.0	0.0991	4400	500
2+GRD x 185/50	37/Compacted	16.30	1.6	2.1	45.5	0.0991	4600	500
2+GRD x 240/35	61/Compacted	18.70	1.7	2.3	51.0	0.0754	6000	500
2+GRD x 240/70	61/Compacted	18.70	1.7	2.3	51.5	0.0754	6000	500
2+GRD x 300/35	61/Compacted	20.90	1.8	2.4	56.0	0.0601	7000	500
2+GRD x 300/70	61/Compacted	20.90	1.8	2.4	56.5	0.0601	7500	500
2+GRD x 400/50	61/Compacted	23.50	2.0	2.6	62.5	0.0470	9000	300
2+GRD x 400/70	61/Compacted	20.90	1.8	2.4	63.0	0.0601	9000	400

Table 1 (continued)

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
3+GRD x 1.5/1.5	7/Non-compacted	1.59	0.7	1.8	12.0	12.1	180	500
3+GRD x 2.5/1.5	7/Non-compacted	2.01	0.7	1.8	13.5	7.41	220	500
3+GRD x 2.5/2.5	7/Non-compacted	2.01	0.7	1.8	13.5	7.41	230	500
3+GRD x 4/2.5	7/Non-compacted	2.55	0.7	1.8	15.0	4.61	290	500
3+GRD x 4/4	7/Non-compacted	2.55	0.7	1.8	14.5	4.61	300	500
3+GRD x 6/2.5	7/Non-compacted	3.12	0.7	1.8	16.0	3.08	360	500
3+GRD x 6/4	7/Non-compacted	3.12	0.7	1.8	16.0	3.08	370	500
3+GRD x 6/6	7/Non-compacted	3.12	0.7	1.8	16.0	3.08	400	500
3+GRD x 10/4	7/Compacted	3.80	0.7	1.8	17.0	1.83	500	500
3+GRD x 10/6	7/Compacted	3.80	0.7	1.8	17.5	1.83	500	500
3+GRD x 10/10	7/Compacted	3.80	0.7	1.8	18.0	1.83	550	500
3+GRD x 16/6	7/Compacted	4.80	0.7	1.8	19.5	1.15	700	500
3+GRD x 16/10	7/Compacted	4.80	0.7	1.8	19.5	1.15	750	500
3+GRD x 16/16	7/Compacted	4.80	0.7	1.8	20.0	1.15	800	500
3+GRD x 25/6	7/Compacted	6.00	0.9	1.8	22.5	0.727	1000	500
3+GRD x 25/10	7/Compacted	6.00	0.9	1.8	23.0	0.727	1100	500
3+GRD x 25/16	7/Compacted	6.00	0.9	1.8	23.0	0.727	1100	500
3+GRD x 35/6	7/Compacted	7.10	0.9	1.8	25.0	0.524	1400	500
3+GRD x 35/10	7/Compacted	7.10	0.9	1.8	25.0	0.524	1400	500
3+GRD x 35/16	7/Compacted	7.10	0.9	1.8	25.5	0.524	1400	500
3+GRD x 50/6	19/Compacted	8.30	1.0	1.8	27.5	0.387	1700	500
3+GRD x 50/10	19/Compacted	8.30	1.0	1.8	27.5	0.387	1700	500
3+GRD x 50/16	19/Compacted	8.30	1.0	1.8	28.0	0.387	1800	500
3+GRD x 70/10	19/Compacted	9.90	1.1	1.9	31.5	0.268	2400	500
3+GRD x 70/16	19/Compacted	9.90	1.1	1.9	32.0	0.268	2400	500
3+GRD x 70/25	19/Compacted	9.90	1.1	2.0	32.5	0.268	2600	500
3+GRD x 70/35	19/Compacted	9.90	1.1	2.0	33.5	0.268	2700	500
3+GRD x 95/16	19/Compacted	11.70	1.1	2.0	36.0	0.193	3200	500
3+GRD x 95/25	19/Compacted	11.70	1.1	2.1	36.5	0.193	3300	500
3+GRD x 120/16	37/Compacted	13.20	1.2	2.1	39.5	0.153	4000	500
3+GRD x 120/25	37/Compacted	13.20	1.2	2.2	40.0	0.153	4200	500
3+GRD x 120/35	37/Compacted	13.20	1.2	2.2	40.5	0.153	4300	500

Table 1 (continued)

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
3+GRD x 150/16	37/Compacted	14.60	1.4	2.2	44.0	0.124	4900	500
3+GRD x 150/25	37/Compacted	14.60	1.4	2.2	44.5	0.124	5000	500
3+GRD x 150/35	37/Compacted	14.60	1.4	2.4	44.5	0.124	5000	500
3+GRD x 150/50	37/Compacted	14.60	1.4	2.4	45.5	0.124	5500	500
3+GRD x 150/70	37/Compacted	14.60	1.4	2.3	45.5	0.124	5500	500
3+GRD x 185/25	37/Compacted	16.30	1.6	2.4	49.5	0.0991	6000	500
3+GRD x 185/35	37/Compacted	16.30	1.6	2.4	49.5	0.0991	6500	500
3+GRD x 185/50	37/Compacted	16.30	1.6	2.5	50.0	0.0991	6500	500
3+GRD x 240/25	61/Compacted	18.70	1.7	2.4	55.0	0.0754	8000	500
3+GRD x 240/35	61/Compacted	18.70	1.7	2.5	55.5	0.0754	8000	500
3+GRD x 240/70	61/Compacted	18.70	1.7	2.7	56.5	0.0754	8500	500
3+GRD x 240/95	61/Compacted	18.70	1.7	2.8	57.5	0.0754	8500	500
3+GRD x 300/25	61/Compacted	20.90	1.8	2.9	61.0	0.0601	1000	300
3+GRD x 300/35	61/Compacted	20.90	1.8	2.7	61.0	0.0601	10000	300
3+GRD x 300/50	61/Compacted	20.90	1.8	2.9	61.0	0.0601	10000	300
3+GRD x 300/70	61/Compacted	20.90	1.8	2.7	61.0	0.0601	10500	300
3+GRD x 400/25	61/Compacted	23.50	2.0	2.9	68.0	0.0470	12500	300
3+GRD x 400/50	61/Compacted	23.50	2.0	2.9	68.0	0.0470	12500	300
3+GRD x 400/70	61/Compacted	23.50	2.0	2.9	68.5	0.0470	13000	300

Table 1 (continued)

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
4+GRD x 1.5/1.5	7/Non-compacted	1.59	0.7	1.8	13.0	12.1	210	500
4+GRD x 2.5/1.5	7/Non-compacted	2.01	0.7	1.8	15.0	7.41	270	500
4+GRD x 2.5/2.5	7/Non-compacted	2.01	0.7	1.8	14.5	7.41	270	500
4+GRD x 4/2.5	7/Non-compacted	2.55	0.7	1.8	16.5	4.61	350	500
4+GRD x 4/4	7/Non-compacted	2.55	0.7	1.8	16.0	4.61	360	500
4+GRD x 6/2.5	7/Non-compacted	3.12	0.7	1.8	17.5	3.08	450	500
4+GRD x 6/4	7/Non-compacted	3.12	0.7	1.8	18.0	3.08	470	500
4+GRD x 6/6	7/Non-compacted	3.12	0.7	1.8	17.5	3.08	480	500
4+GRD x 10/2.5	7/Compacted	3.80	0.7	1.8	18.5	1.83	600	500
4+GRD x 10/4	7/Compacted	3.80	0.7	1.8	19.0	1.83	650	500
4+GRD x 10/6	7/Compacted	3.80	0.7	1.8	19.5	1.83	650	500
4+GRD x 16/4	7/Compacted	4.80	0.7	1.8	21.5	1.15	900	500
4+GRD x 16/6	7/Compacted	4.80	0.7	1.8	21.5	1.15	900	500
4+GRD x 16/10	7/Compacted	4.80	0.7	1.8	22.0	1.15	950	500
4+GRD x 25/4	7/Compacted	6.00	0.9	1.8	25.5	0.727	1300	500
4+GRD x 25/6	7/Compacted	6.00	0.9	1.8	25.5	0.727	1300	500
4+GRD x 25/10	7/Compacted	6.00	0.9	1.8	26.0	0.727	1300	500
4+GRD x 35/10	7/Compacted	7.10	0.9	1.8	28.5	0.524	1700	500
4+GRD x 35/16	7/Compacted	7.10	0.9	1.8	28.5	0.524	1800	500
4+GRD x 50/10	19/Compacted	8.30	1.0	1.9	31.5	0.387	2300	500
4+GRD x 50/16	19/Compacted	8.30	1.0	2.0	32.5	0.387	2300	500
4+GRD x 70/10	19/Compacted	9.90	1.1	2.0	35.5	0.268	3100	500
4+GRD x 70/16	19/Compacted	9.90	1.1	2.1	37.0	0.268	3200	500
4+GRD x 70/25	19/Compacted	9.90	1.1	2.1	37.5	0.268	3400	500
4+GRD x 95/6	19/Compacted	11.70	1.1	2.2	40.0	0.193	4100	500
4+GRD x 95/10	19/Compacted	11.70	1.1	2.2	40.0	0.193	4200	500
4+GRD x 95/16	19/Compacted	11.70	1.1	2.1	41.0	0.193	4200	500
4+GRD x 95/25	19/Compacted	11.70	1.1	2.3	42.0	0.193	4400	500
4+GRD x 120/16	37/Compacted	13.20	1.2	2.3	45.0	0.153	5500	500
4+GRD x 120/25	37/Compacted	13.20	1.2	2.4	46.0	0.153	5440	500
4+GRD x 120/35	37/Compacted	13.20	1.2	2.4	47.0	0.153	5500	500

Table 1 (continued)

No. of cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
4+GRD x 150/16	37/Compacted	14.60	1.4	2.4	49.5	0.124	6500	500
4+GRD x 150/25	37/Compacted	14.60	1.4	2.4	50.0	0.124	6500	500
4+GRD x 150/35	37/Compacted	14.60	1.4	2.6	51.0	0.124	7000	500
4+GRD x 150/50	37/Compacted	14.60	1.4	2.6	52.0	0.124	7000	500
4+GRD x 185/25	37/Compacted	16.30	1.6	2.6	55.0	0.0991	8000	500
4+GRD x 185/35	37/Compacted	16.30	1.6	2.7	56.5	0.0991	8500	500
4+GRD x 185/50	37/Compacted	16.30	1.6	2.8	57.5	0.0991	8500	500
4+GRD x 240/25	61/Compacted	18.70	1.7	2.8	61.0	0.0754	10500	300
4+GRD x 240/35	61/Compacted	18.70	1.7	2.8	61.0	0.0754	10500	300
4+GRD x 240/70	61/Compacted	18.70	1.7	2.9	64.5	0.0754	11000	400
4+GRD x 300/16	61/Compacted	20.90	1.8	2.9	68.0	0.0601	13000	300
4+GRD x 300/25	61/Compacted	20.90	1.8	2.9	68.0	0.0601	13000	300
4+GRD x 300/35	61/Compacted	20.90	1.8	2.9	67.5	0.0601	13000	300
4+GRD x 300/70	61/Compacted	20.90	1.8	3.2	71.0	0.0601	13500	300
4+GRD x 400/16	61/Compacted	23.50	2.0	3.2	76.5	0.0470	16500	200
4+GRD x 400/25	61/Compacted	23.50	2.0	3.2	76.5	0.0470	16500	200
4+GRD x 400/35	61/Compacted	23.50	2.0	3.2	76.5	0.0470	16500	200
4+GRD x 400/50	61/Compacted	23.50	2.0	3.2	77.0	0.0470	16500	200
4+GRD x 400/70	61/Compacted	23.50	2.0	3.4	78.0	0.0470	17000	200
4+GRD x 400/120	61/Compacted	23.50	2.0	3.5	80.0	0.0470	18000	200

Table 1 (continued)

FOR GROUNDED CONDUCTORS

No. of core	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Conductor resistance at 20°C maximum (Ohm/km)
1	1.5	7/Non-compacted	1.59	0.7	12.1
1	2.5	7/Non-compacted	2.01	0.7	7.41
1	4	7/Non-compacted	2.55	0.7	4.61
1	6	7/Non-compacted	3.12	0.7	3.08
1	10	7/Compacted	3.80	0.7	1.83
1	16	7/Compacted	4.80	0.7	1.15
1	25	7/Compacted	6.00	0.9	0.727
1	35	7/Compacted	7.10	0.9	0.524
1	50	19/Compacted	8.30	1.0	0.387
1	70	19/Compacted	9.90	1.1	0.268
1	95	19/Compacted	11.70	1.1	0.193
1	120	37/Compacted	13.20	1.2	0.153