

SPECIFICATION**For****CVV-SWA**

600V PVC Insulated PVC Inner Sheathed

Steel Wire Armored PVC Outer Sheathed

Control Cable

(600V, Cu/PVC/PVC/SWA/PVC)

BY

(Wachara Sangsomritphon)

MANAGER, Cable Design Section

APP.

(Winai Ariyasakulsap)

MANAGER, Development Department

APP.

()

CUSTOMER

TTCL

Rev.	Date	Description
0	30/3/2021	Issued specification
1	19/12/2022	Cancel code "0010"

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 600V copper conductor polyvinyl chloride (PVC) insulated polyvinyl chloride (PVC) inner sheathed steel wire armored polyvinyl chloride (PVC) outer sheathed control cable.

The cables shall be in according to applicable specification of THAI YAZAKI Standard based on JIS C 3401 and TIS 11 Part 5-2553.

The finished cables shall meet the flame test requirements per IEC 60332-1.

2. Conductor

The conductor shall be flexible stranded uncoated annealed copper conductor in accordance with IEC 60228 : 2004, Class 5.

For size 0.5 to 4 mm² : The direction of lay shall be left-hand (S) lay.

For size 6 and 10 mm² : The direction of lay shall be right-hand (Z) lay.

3. Insulation

The insulation shall be polyvinyl chloride (PVC/D) compound meet the requirements of TIS 11 Part 5-2553.

The average insulation thickness shall be based on Table 3 of TIS 11-2531 and not less than the value in Table 1.

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

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 assembled core.

5. Core Identification

The cores shall be identified by colors or by number printed on the insulation, as follows :

2-cores : blue, brown

3-cores : brown, black, grey

4-cores : blue, brown, black, grey

For 5-cores to 30-cores :

The cores shall be identified by the arabic numerals printed longitudinally and continuously on the surface of black insulation

6. Inner Sheath

The inner sheath shall be polyvinyl chloride (PVC) compound applied over the binder tape.

The approximate thickness given in Table 1.

The color of the inner sheath shall be black.

7. Steel Wire Armor

The armor shall be galvanized round steel wire applied with a minimum gap between adjacent wires over the inner sheathed.

A suitable tape shall be applied helically over the armored core.

8. Outer Sheath

The outer sheath shall be sunlight resistant polyvinyl chloride (PVC/ST5) compound meet the requirements of TIS 11 Part 5-2553.


The average thickness shall be not less than the value in Table 1.

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

The color of the outer sheath shall be black.

9. 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. Rated circuit voltage "600V"
4. Type of insulation "PVC"
5. Type of cable "CONTROL CABLE"
6. Number of cores and size of conductor
7. The continuous reel length marking (in figure) shall be made on the sheath at every 1 meter

10. Test and Properties

The cable shall be meet the requirements in Test and Inspection and Table 1, when tested in accordance with JIS C 3401, TIS 11 Part 2-2553, TIS 11 Part 5-2553, IEC 60228 : 2004 and IEC 60332-1.


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

11. Packing

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

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

Each reel shall be clearly marked as follows.

1. Designation "CVV-SWA"
2. Number of cores and size of conductor
3. Length of cable contained in the drum
4. Net weight
5. Gross weight
6. Manufacturer's name and/or trade mark "  **YAZAKI** "
7. Rolling direction of reel
8. Year of manufacture
9. TTCL Work No.
10. Drum Number

Test and Inspection

Routine Tests

1. Maximum conductor resistance, Ohm/km specified in Table 1
2. AC test voltage for 1 minutes, V2000

Sample Tests

3. Construction.....specified in Table 1

Type Tests

4. Minimum insulation resistance at 70 °C, MOhm-km.....specified in Table 1
5. Flame retardant tested according to IEC 60332-1

Remark

Reference standard

Test item 1 refer IEC 60228:2004, Class 5

Test item 2 refer JIS C 3401

Test item 3, 4 refer TIS 11-2531

Test item 5 refer IEC 60332-1

Definition concerning the tests

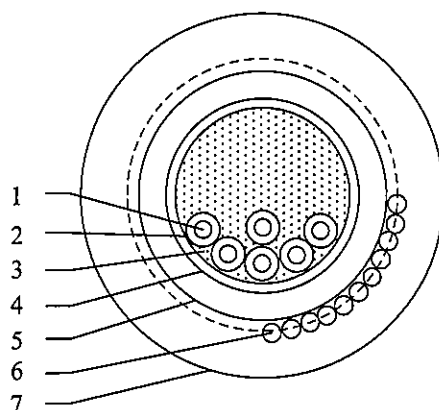
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	Flexible stranded annealed copper
2	Insulation	Polyvinyl chloride (PVC/D)
3	Filler	Non-hygroscopic
4	Binder tape	Spun bond tape or suitable tape
5	Inner sheath	Polyvinyl chloride (PVC)
6	Armor	Galvanized steel wire
7	Outer sheath	Polyvinyl chloride (PVC/ST5)

Application: For supervisory electrical equipment, station control circuits, outdoor, suitable installation in the dry or wet cable trenches. Maximum conductor temperature of 70 °C for normal operation and 160 °C for short circuit conditions.

Table 1

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
2	1.5	Flexible	1.60	0.6	1.2	9.5	0.80	1.8	15.0	13.3	0.0089	350	300
2	2.5	Flexible	2.10	0.7	1.2	10.5	0.80	1.8	16.5	7.98	0.0081	420	300
2	4	Flexible	2.60	0.8	1.2	12.0	1.25	1.8	19.0	4.95	0.0076	650	300
2	6	Flexible	3.40	0.8	1.2	14.0	1.25	1.8	20.5	3.30	0.0061	750	300
3	1.5	Flexible	1.60	0.6	1.2	9.5	0.80	1.8	15.5	13.3	0.0089	380	300
3	2.5	Flexible	2.10	0.7	1.2	11.0	1.25	1.8	18.0	7.98	0.0081	600	300
3	4	Flexible	2.60	0.8	1.2	13.0	1.25	1.8	19.5	4.95	0.0076	700	300
3	6	Flexible	3.40	0.8	1.2	14.5	1.25	1.8	21.0	3.30	0.0061	850	300
4	1.5	Flexible	1.60	0.6	1.2	10.5	0.80	1.8	16.0	13.3	0.0089	420	300
4	2.5	Flexible	2.10	0.7	1.2	12.0	1.25	1.8	19.0	7.98	0.0081	650	300
4	4	Flexible	2.60	0.8	1.2	14.0	1.25	1.8	20.5	4.95	0.0076	800	300
4	6	Flexible	3.40	0.8	1.2	16.0	1.25	1.8	22.5	3.30	0.0061	1000	300
4	10	Flexible	4.60	0.9	1.2	19.0	1.60	1.8	26.5	1.91	0.0059	1500	300
5	1.5	Flexible	1.60	0.6	1.2	11.5	1.25	1.8	18.0	13.3	0.0089	600	300
5	2.5	Flexible	2.10	0.7	1.2	13.0	1.25	1.8	20.0	7.98	0.0081	750	300
5	4	Flexible	2.60	0.8	1.2	15.5	1.25	1.8	22.0	4.95	0.0076	900	300
5	6	Flexible	3.40	0.8	1.2	17.5	1.60	1.8	25.0	3.30	0.0061	1300	300

Table 1(continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
6	1.5	Flexible	1.60	0.6	1.2	12.0	1.25	1.8	19.0	13.3	0.0089	650	300
6	2.5	Flexible	2.10	0.7	1.2	14.5	1.25	1.8	21.0	7.98	0.0081	800	300
6	4	Flexible	2.60	0.8	1.2	16.5	1.60	1.8	24.0	4.95	0.0076	1100	300
6	6	Flexible	3.40	0.8	1.2	19.0	1.60	1.8	26.5	3.30	0.0061	1400	300
7	1.5	Flexible	1.60	0.6	1.2	12.0	1.25	1.8	19.0	13.3	0.0089	650	300
7	2.5	Flexible	2.10	0.7	1.2	14.5	1.25	1.8	21.0	7.98	0.0081	850	300
7	4	Flexible	2.60	0.8	1.2	16.5	1.60	1.8	24.0	4.95	0.0076	1200	300
7	6	Flexible	3.40	0.8	1.2	19.0	1.60	1.8	26.5	3.30	0.0061	1500	300
8	1.5	Flexible	1.60	0.6	1.2	13.0	1.25	1.8	20.0	13.3	0.0089	700	300
8	2.5	Flexible	2.10	0.7	1.2	15.5	1.25	1.8	22.0	7.98	0.0081	900	300
8	4	Flexible	2.60	0.8	1.2	18.0	1.60	1.8	25.5	4.95	0.0076	1300	300
8	6	Flexible	3.40	0.8	1.2	20.5	1.60	1.8	28.0	3.30	0.0061	1600	300
9	1.5	Flexible	1.60	0.6	1.2	14.0	1.25	1.8	21.0	13.3	0.0089	800	300
9	2.5	Flexible	2.10	0.7	1.2	16.5	1.60	1.8	24.0	7.98	0.0081	1100	300
9	4	Flexible	2.60	0.8	1.2	19.5	1.60	1.8	27.0	4.95	0.0076	1400	300
9	6	Flexible	3.40	0.8	1.2	22.5	2.00	1.9	31.0	3.30	0.0061	2000	300

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
10	1.5	Flexible	1.60	0.6	1.2	15.0	1.25	1.8	22.0	13.3	0.0089	850	300
10	2.5	Flexible	2.10	0.7	1.2	18.0	1.60	1.8	25.0	7.98	0.0081	1200	300
10	4	Flexible	2.60	0.8	1.2	21.0	1.60	1.8	28.5	4.95	0.0076	1500	300
10	6	Flexible	3.40	0.8	1.2	24.0	2.00	1.9	32.5	3.30	0.0061	2200	300
11	1.5	Flexible	1.60	0.6	1.2	15.0	1.25	1.8	22.0	13.3	0.0089	850	300
11	2.5	Flexible	2.10	0.7	1.2	18.0	1.60	1.8	25.0	7.98	0.0081	1300	300
11	4	Flexible	2.60	0.8	1.2	21.0	1.60	1.8	28.5	4.95	0.0076	1600	300
11	6	Flexible	3.40	0.8	1.2	24.0	2.00	1.9	32.5	3.30	0.0061	2300	300
12	1.5	Flexible	1.60	0.6	1.2	15.5	1.25	1.8	22.5	13.3	0.0089	900	300
12	2.5	Flexible	2.10	0.7	1.2	18.5	1.60	1.8	26.0	7.98	0.0081	1300	300
12	4	Flexible	2.60	0.8	1.2	22.0	1.60	1.8	29.0	4.95	0.0076	1700	300
12	6	Flexible	3.40	0.8	1.2	25.0	2.00	2.0	34.0	3.30	0.0061	2400	300
13	1.5	Flexible	1.60	0.6	1.2	16.5	1.60	1.8	24.0	13.3	0.0089	1100	300
13	2.5	Flexible	2.10	0.7	1.2	19.5	1.60	1.8	27.0	7.98	0.0081	1400	300
13	4	Flexible	2.60	0.8	1.2	23.0	2.00	1.9	31.5	4.95	0.0076	2000	300
13	6	Flexible	3.40	0.8	1.2	26.5	2.00	2.0	35.0	3.30	0.0061	2500	300

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
14	1.5	Flexible	1.60	0.6	1.2	16.5	1.60	1.8	24.0	13.3	0.0089	1100	300
14	2.5	Flexible	2.10	0.7	1.2	19.5	1.60	1.8	27.0	7.98	0.0081	1400	300
14	4	Flexible	2.60	0.8	1.2	23.0	2.00	1.9	31.5	4.95	0.0076	2000	300
14	6	Flexible	3.40	0.8	1.2	26.5	2.00	2.0	35.0	3.30	0.0061	2600	300
15	1.5	Flexible	1.60	0.6	1.2	17.0	1.60	1.8	24.5	13.3	0.0089	1200	300
15	2.5	Flexible	2.10	0.7	1.2	20.0	1.60	1.8	27.5	7.98	0.0081	1500	300
15	4	Flexible	2.60	0.8	1.2	23.5	2.00	1.9	32.0	4.95	0.0076	2100	300
15	6	Flexible	3.40	0.8	1.2	27.5	2.00	2.1	36.5	3.30	0.0061	2800	300
16	1.5	Flexible	1.60	0.6	1.2	17.0	1.60	1.8	24.5	13.3	0.0089	1200	300
16	2.5	Flexible	2.10	0.7	1.2	20.5	1.60	1.8	28.0	7.98	0.0081	1500	300
16	4	Flexible	2.60	0.8	1.2	24.0	2.00	1.9	32.5	4.95	0.0076	2200	300
16	6	Flexible	3.40	0.8	1.2	28.0	2.00	2.1	37.0	3.30	0.0061	2800	300
17	1.5	Flexible	1.60	0.6	1.2	18.0	1.60	1.8	25.5	13.3	0.0089	1200	300
17	2.5	Flexible	2.10	0.7	1.2	21.5	1.60	1.8	29.0	7.98	0.0081	1600	300
17	4	Flexible	2.60	0.8	1.2	25.5	2.00	2.0	34.5	4.95	0.0076	2400	300
17	6	Flexible	3.40	0.8	1.2	29.5	2.00	2.1	38.5	3.30	0.0061	3100	300

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance minimum at 70 °C (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
18	1.5	Flexible	1.60	0.6	1.2	18.0	1.60	1.8	25.5	13.3	0.0089	1300	300
18	2.5	Flexible	2.10	0.7	1.2	21.5	1.60	1.8	29.0	7.98	0.0081	1600	300
18	4	Flexible	2.60	0.8	1.2	25.5	2.00	2.0	34.5	4.95	0.0076	2400	300
18	6	Flexible	3.40	0.8	1.2	29.5	2.00	2.1	38.5	3.30	0.0061	3100	300
19	1.5	Flexible	1.60	0.6	1.2	18.0	1.60	1.8	25.5	13.3	0.0089	1300	300
19	2.5	Flexible	2.10	0.7	1.2	21.5	1.60	1.8	29.0	7.98	0.0081	1700	300
19	4	Flexible	2.60	0.8	1.2	25.5	2.00	2.0	34.5	4.95	0.0076	2400	300
19	6	Flexible	3.40	0.8	1.2	29.5	2.00	2.1	38.5	3.30	0.0061	3100	300
20	1.5	Flexible	1.60	0.6	1.2	18.5	1.60	1.8	26.0	13.3	0.0089	1300	300
20	2.5	Flexible	2.10	0.7	1.2	22.0	2.00	1.9	30.5	7.98	0.0081	1900	300
20	4	Flexible	2.60	0.8	1.2	26.0	2.00	2.0	35.0	4.95	0.0076	2500	300
20	6	Flexible	3.40	0.8	1.2	30.0	2.00	2.2	39.5	3.30	0.0061	3300	300
21	1.5	Flexible	1.60	0.6	1.2	19.0	1.60	1.8	26.5	13.3	0.0089	1300	300
21	2.5	Flexible	2.10	0.7	1.2	22.5	2.00	1.9	31.0	7.98	0.0081	2000	300
21	4	Flexible	2.60	0.8	1.2	27.0	2.00	2.0	35.5	4.95	0.0076	2600	300
21	6	Flexible	3.40	0.8	1.2	31.0	2.00	2.2	40.5	3.30	0.0061	3400	300

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
22	1.5	Flexible	1.60	0.6	1.2	20.0	1.60	1.8	27.5	13.3	0.0089	1400	300
22	2.5	Flexible	2.10	0.7	1.2	24.0	2.00	1.9	32.5	7.98	0.0081	2100	300
22	4	Flexible	2.60	0.8	1.2	28.5	2.00	2.1	37.5	4.95	0.0076	2800	300
23	6	Flexible	3.40	0.8	1.2	32.5	2.00	2.2	42.0	3.30	0.0061	3600	300
23	1.5	Flexible	1.60	0.6	1.2	20.0	1.60	1.8	27.5	13.3	0.0089	1400	300
23	2.5	Flexible	2.10	0.7	1.2	24.0	2.00	1.9	32.5	7.98	0.0081	2100	300
23	4	Flexible	2.60	0.8	1.2	28.5	2.00	2.1	37.5	4.95	0.0076	2800	300
23	6	Flexible	3.40	0.8	1.2	32.5	2.00	2.2	42.0	3.30	0.0061	3600	300
24	1.5	Flexible	1.60	0.6	1.2	21.0	1.60	1.8	28.5	13.3	0.0089	1500	300
24	2.5	Flexible	2.10	0.7	1.2	25.0	2.00	2.0	34.0	7.98	0.0081	2300	300
24	4	Flexible	2.60	0.8	1.2	30.0	2.00	2.1	39.0	4.95	0.0076	2900	300
24	6	Flexible	3.40	0.8	1.2	34.5	2.00	2.3	44.0	3.30	0.0061	3800	300
25	1.5	Flexible	1.60	0.6	1.2	21.0	1.60	1.8	28.5	13.3	0.0089	1500	300
25	2.5	Flexible	2.10	0.7	1.2	25.0	2.00	2.0	34.0	7.98	0.0081	2300	300
25	4	Flexible	2.60	0.8	1.2	30.0	2.00	2.1	39.0	4.95	0.0076	3000	300
25	6	Flexible	3.40	0.8	1.2	34.5	2.00	2.3	44.0	3.30	0.0061	3900	300
26	1.5	Flexible	1.60	0.6	1.2	21.0	1.60	1.8	28.5	13.3	0.0089	1500	300
26	2.5	Flexible	2.10	0.7	1.2	25.0	2.00	2.0	34.0	7.98	0.0081	2300	300
26	4	Flexible	2.60	0.8	1.2	30.0	2.00	2.1	39.0	4.95	0.0076	3000	300
26	6	Flexible	3.40	0.8	1.2	34.5	2.00	2.3	44.0	3.30	0.0061	4000	300

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor type	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer sheath thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Insulation resistance at 70 °C minimum (MOhm-km)	Weight of cable approx. (kg/km)	Standard packing length (m)
27	1.5	Flexible	1.60	0.6	1.2	21.5	1.60	1.8	29.0	13.3	0.0089	1600	300
27	2.5	Flexible	2.10	0.7	1.2	25.5	2.00	2.0	34.5	7.98	0.0081	2400	300
27	4	Flexible	2.60	0.8	1.2	30.5	2.00	2.2	40.0	4.95	0.0076	3100	300
27	6	Flexible	3.40	0.8	1.2	35.5	2.00	2.3	45.0	3.30	0.0061	4100	300
28	1.5	Flexible	1.60	0.6	1.2	22.5	2.00	1.9	31.0	13.3	0.0089	1900	300
28	2.5	Flexible	2.10	0.7	1.2	26.5	2.00	2.0	35.5	7.98	0.0081	2500	300
28	4	Flexible	2.60	0.8	1.2	31.5	2.00	2.2	41.0	4.95	0.0076	3300	300
28	6	Flexible	3.40	0.8	1.3	37.0	2.50	2.4	48.0	3.30	0.0061	4800	300
29	1.5	Flexible	1.60	0.6	1.2	22.5	2.00	1.9	31.0	13.3	0.0089	1900	300
29	2.5	Flexible	2.10	0.7	1.2	26.5	2.00	2.0	35.5	7.98	0.0081	2500	300
29	4	Flexible	2.60	0.8	1.2	31.5	2.00	2.2	41.0	4.95	0.0076	3300	300
29	6	Flexible	3.40	0.8	1.3	37.0	2.50	2.4	48.0	3.30	0.0061	4800	300
30	1.5	Flexible	1.60	0.6	1.2	22.5	2.00	1.9	31.0	13.3	0.0089	1900	300
30	2.5	Flexible	2.10	0.7	1.2	26.5	2.00	2.0	35.5	7.98	0.0081	2500	300
30	4	Flexible	2.60	0.8	1.2	31.5	2.00	2.2	41.0	4.95	0.0076	3400	300
30	6	Flexible	3.40	0.8	1.3	37.0	2.50	2.4	48.0	3.30	0.0061	4900	300