

Test Report

Lineset Cover System SLIMDUCT SD

January 31, 2020

Inaba Denki Sangyo. Co., Ltd.
Research & development division

1. Weatherproof

Carrying out the accelerated weather resistance test for test pieces of polyvinyl chloride used for SLIMDUCT SD, we checked the change of characteristics with the passage of testing time.

(1) Test Items:

During the accelerated weather resistance test for 0 to 2000 hours, the following characteristics of test pieces were measured at every 200 hours;

- Tensile Strength
- Bending Strength

(2) Test Pieces:

- Tensile Strength : Conform to JIS K 6745
- Bending Strength : Conform to JIS K 7203

(3) Testing Devices:

- Accelerated Weather Resistance Testing Device: Sunshine Carbon Weather Meter (Irradiation condition conforms to JIS D 0205.)
- Strength Testing Equipment: At Kyoto Industry Testing Laboratory

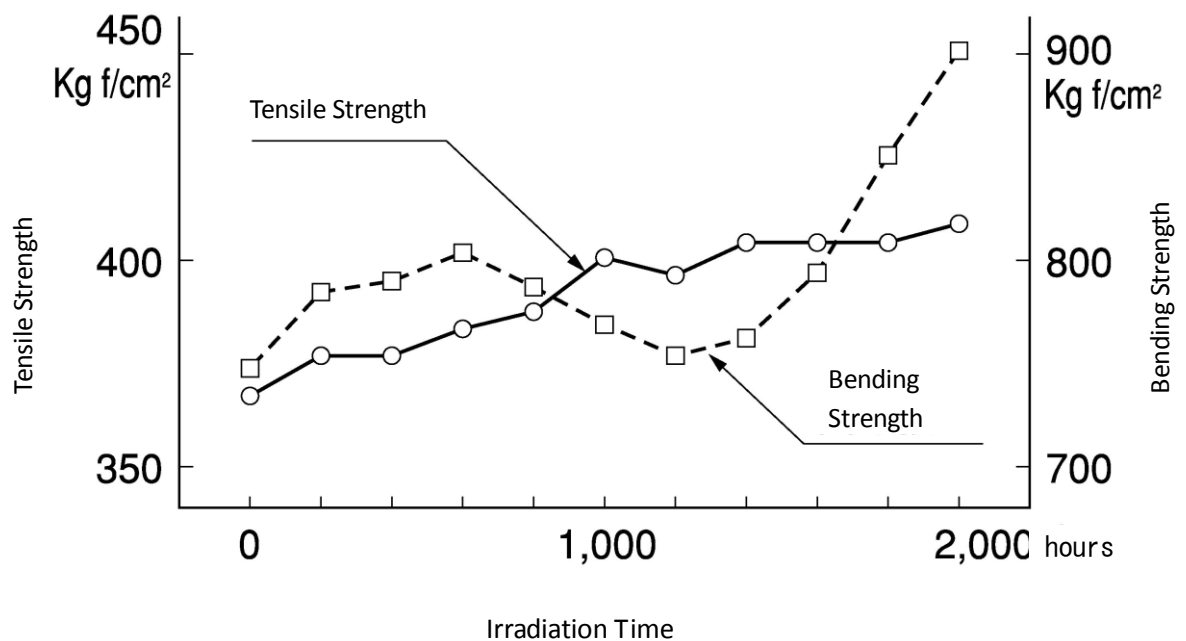
(4) Test Result:

Test Result is shown in below Figure-1.

No damages observed during 2000 hours through the test.

Besides, there was no significant difference on color distinction.

Figure-1: Test result



2. Mounting Strength by Wood Screw

We checked the mounting strength at wood screw mounting part on SLIMDUCT SD Series.

(1) Test Pieces and Materials:

Length of SLIMDUCT SD:	100mm (≒14")
Wood	: Japanese cedar
Copper tube	: $\phi 8$ mm (≒0.31")
Wire	: $\phi 2$ mm (≒0.08")
Wood screw	: $\phi 3.5$ mm x length 28mm (≒0.14"x1.10")
Washer	: outer dia. 9mm (≒0.35"), inner dia. 4mm (≒0.16")

(2) Measuring Equipment : Tension Tester

(3) Test Method:

As shown in Figure-2, we performed the tension test with SLIMDUCT SD mounted on the wood by a wood screw. To avoid a deformation of SLIMDUCT SD, set a copper tube of $\phi 8$ mm (≒0.31") horizontally inside and then pull so that the tensile stress would be applied only at the wood screw part.

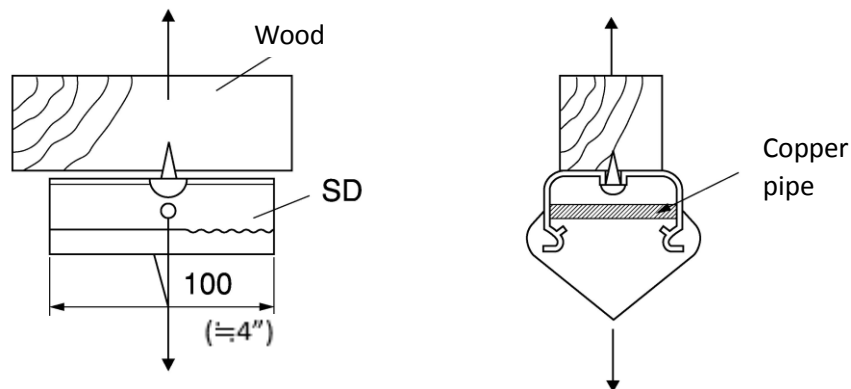


Figure-2

(4) Test Result:

Mounting strength by wood screw is shown in Table-1.

Table-1

Condition	Tensile Strength
Wood screw only	588 (60kgf ≒132 lbs)
Wood screw with washer	735 (75kg ≒165 lbs)

3. Disconnection-proof Strength Between Cover and Base

We checked disconnection-proof strength between cover and base of SLIMDUCT SD Series.

(1) Test Pieces:

SLIMDUCT SD Length: 300mm ($\approx 11-7/8''$) (SD-66, 77, 100 and 140)

(2) Measuring Equipment: Tension Tester

(3) Test Method:

As shown in Figure-3, pull the assembled cover and base from the upper and lower ends until cover and base disconnect each other.

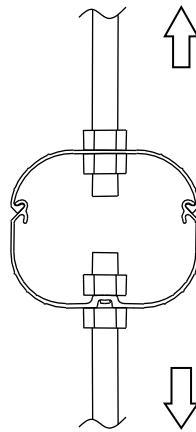


Figure-3

(4) Test Result:

Disconnection-proof strength shown in Table-2.

Table-2
Disconnection-proof Strength

Size	Disconnection-proof Strength (N)
SD- 66	4410 (450kgf \approx 992 lbs)
SD- 77	
SD-100	
SD-140	

NOTE: Above numerical value is converted for 2m ($\approx 78-3/4''$) length of SLIMDUCT SD.

4. Expansion/Contraction Length by Temperature Variation

We checked the expansion/contraction length by temperature variation.

(1) Test Pieces:

SLIMDUCT SD-66 IVORY

Length: Cover = 150mm ($\approx 6''$), Base = 150mm ($\approx 6''$)

(2) Measuring Condition:

Temperature range: -20 to 60°C ($\approx -4F$ to 140F)

Leaving time : 3 hours

(3) Measuring Equipment: Slide Caliper, Thermostatic chamber

(4) Measuring Method:

Measured by slide caliper after 3 hours left in the thermostatic chamber at setup temperature.

(5) Test Result:

Expansion/contraction length by temperature variation shown in Table-3.

Table-3
Expansion/Contraction Length by Temp. Variation

Temp Test Piece	-20°C ($\approx -4F$)	23°C ($\approx 73F$)	60°C ($\approx 140F$)
Cover	149.7mm ($\approx 6''$)	150mm ($\approx 6''$)	150.5mm ($\approx 6''$)
Base	149.75mm ($\approx 6''$)	150mm ($\approx 6''$)	150.4mm ($\approx 6''$)

Cover = 0.80mm (Rate of change 0.5%)

Base = 0.65mm (Rate of change 0.4%)

5. Weatherproof Test for FLEXIBLE ELL SF

We checked deformation of test piece of Flexible Ell SF by the accelerated weather resistance test.

(1) Test Piece: Flexible Ell SF

(2) Test Method:

Leave the dumbbell specimen of test piece at the following condition according to JIS K 6301.

Environment temperature: 63 \pm 3°C ($\approx 145F\pm 37F$)

Precipitation : 18 minutes/120 minutes

(3) Test Result:

There were no abnormal points observed such as breakage nor crack after 2000hours of irradiation. Besides, there was no significant difference on color distinction.

6. Internal Stress

We checked the internal stress by temperature reliance with a condition of materials maximum contained inside of SLIMDUCT SD.

(1) Test Pieces and Materials:

SLIMDUCT SD (SD-77, SW-77, SK-77, SC-77)

Insulated copper tube : $\phi 15.88\text{mm}$ (5/8"), $\phi 19.05\text{mm}$ (3/4")

Insulation : Thickness 10mm (≈ 0.039 ")

Control cable : $2\text{mm}^2 \times 3\text{cores}$

(2) Measuring Condition:

Measuring temp. range : -20 to 60°C ($\approx -4\text{F}$ to 140F)

Leaving time : for 1 hour after temperature reached at setup condition.

(3) Measuring Equipment : Thermostatic chamber

(4) Measuring Method:

After heating/cooling the test pieces with the assembled materials in thermostat oven, check the deformation of test pieces by eyes when temperature returned back to room condition.

Bending radius of insulated copper tube was set at 4 times of outer diameter of copper tube.

(5) Test Result:

Internal stress by temperature reliance is shown in Table-4.

Table-4 Internal Stress by Temperature Reliance

Measuring Temp.	Deform. Model	Sample 1	Sample 2
	-20°C ($\approx -4\text{F}$)	SW/SK/SC-77	No deformation observed
SD-77		"	"
-10°C ($\approx 14\text{F}$)	SW/SK/SC-77	No deformation observed	No deformation observed
	SD-77	"	"
0°C ($\approx 32\text{F}$)	SW/SK/SC-77	No deformation observed	No deformation observed
	SD-77	"	"
40°C ($\approx 104\text{F}$)	SW/SK/SC-77	No deformation observed	No deformation observed
	SD-77	"	"
50°C ($\approx 122\text{F}$)	SW/SK/SC-77	No deformation observed	No deformation observed
	SD-77	"	"
60°C ($\approx 140\text{F}$)	SW/SK/SC-77	No deformation observed	No deformation observed
	SD-77	"	"