

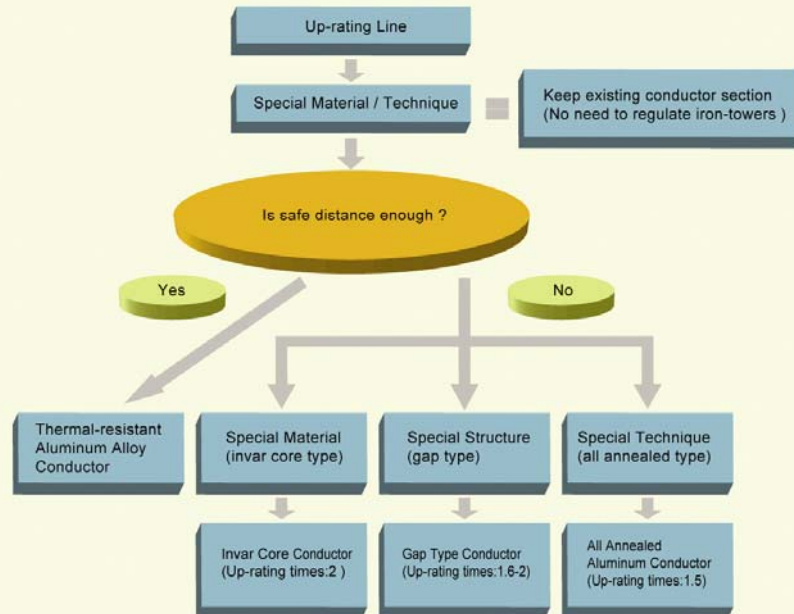
UP-RATING CONDUCTOR

PRODUCTS

- Invar Core Conductor
- Gap Type Conductor
- All Annealed Aluminum Conductor



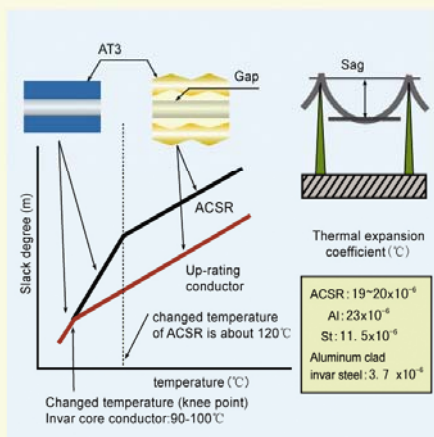
ADVANCED SOLUTION



Up-rating Principle

Increase conductor working temperature by using long term thermal resistant of performance thermal resistant aluminum alloy(AT_n) conductor and all annealed aluminum conductor.
Up-rating conductor's fill-in ratio by compressing conductor to widen the line transmission capacity.

Low-sag Principle



1. Invar Core Conductor

The linear expansion coefficient of the invar is 1/5 of the aluminum alloy conductor, the tension on the aluminum alloy conductor decreases with the temperature increase when the conductor is in working. At knee point temperature, all tension transfers from conductor to the invar core. The conductor's linear expansion coefficient is now equal with the invar cores and keeps low sag under high temperature.

2. Gap Type Conductor

Tension is transformed to the invar steel core by using innovative wiring technique. As a result, the linear expansion coefficient of loose-tube up rating conductor is 1/2 of that of ACSR. This kind of conductor can keep owning low sag under high temperature.

3. All Annealed Aluminum Conductor

Make soft aluminum conductor plasticity transfigure permanently by innovative technique and transfer the conductor's tension to the invar core. So the linear expansion coefficient of the low sag soft aluminum conductor is 1/2 of ACSR. This kind of conductor can keep owning low sag under high temperature.

INVAR CORE UP-RATING CONDUCTOR (ZTACIR)

■ Application

Overhead transmission line bottle-neck project

■ Standard

IEC 60024 JCS 1404

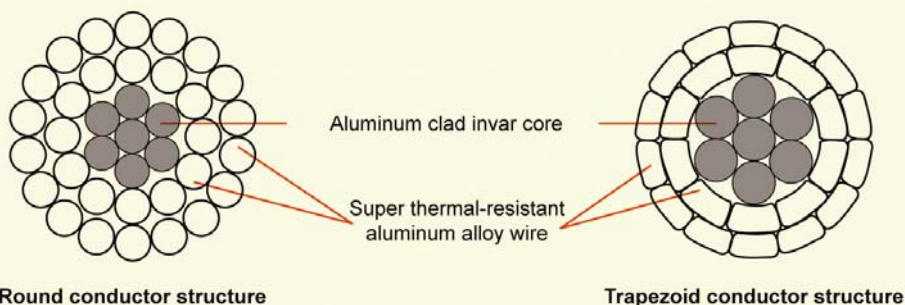
Q/320623 AP 25

■ Structure

Core wire: aluminum clad invar core

Conductor: super thermal-resistant aluminum alloy wire

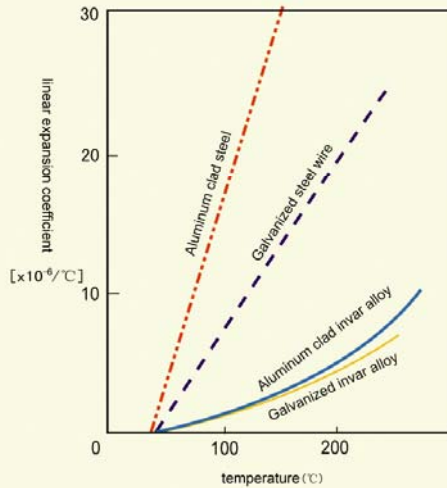
Allowable long-term operation temperature is 210℃.



■ Characteristics

- Current carrying capacity is more than twice than that of ACSR.
- No need for adjustment or reinforcement to existing towers.
- When on double capacity transmission, sag is equal to ACSR.
- Simple construction, installation and maintenance are same with ACSR.

Aluminum Clad Invar Wire

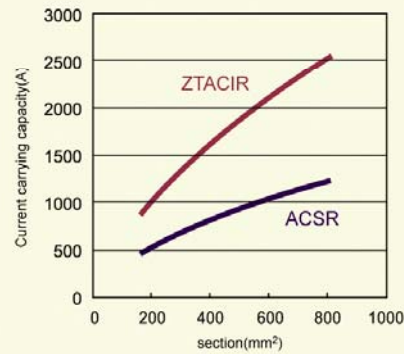


- Invar consists of iron-nickel alloy. Thermal elongation coefficient is $3.7 (\times 10^{-6}/^{\circ}\text{C})$ which is 1/3 of the steel and 1/5 of the aluminum.
- Aluminum clad invar wire can resist high temperature over 300°C and have good anti-corrosion performance.
- Performance comparison of invar wire and steel wire.

Type	Linear Expansion Coefficient $\times 10^{-6}/^{\circ}\text{C}$	Modulus Of Elasticity Gpa	Strain Strength N/mm^2	Conductivity %IACS
Galvanized Steel Wire	11.5	206	1270	8
Aluminum Clad Steel Wire	13.0(20AS)	159(20AS)	686-1569	14-40
Invar Wire	2.8	162	1100	8
Aluminum Clad Invar Wire	3.7	152	1100	14

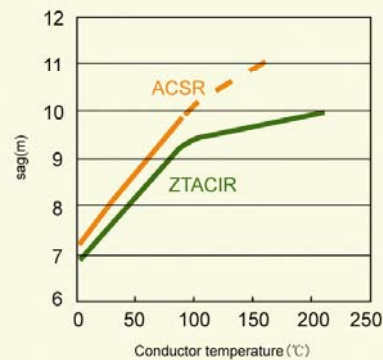
Current Carrying Capacity

- Current carrying capacity is twice of the ACSR(90°C) when Invar core conductor is at 210°C .



Sag

- Keeping the same sag with Aluminum clad steel wire(90°C) when double capacity conductor is in high temperature.



PARAMETER

Super Thermal-Resistant Aluminum Alloy Conductors, Aluminum Clad Invar (10%IACS) Reinforced

Spec mm ²	Structure n/mm		Count Section mm ²			Diameter mm	Break Load KN	20°C DC resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient *10 ⁻⁶ /°C		Current Carrying Capacity A 210°C
	Aluminum Alloy	Aluminum Clad Invar	Aluminum Alloy	Aluminum Clad Invar	Total					Aluminum Clad Invar	Conductor	Aluminum Clad Invar	Conductor	
185	30/2.80	7/2.80	184.7	43.1	227.8	19.60	70.3	0.1507	817.8	152	73.9	3.7	15.3	1040
240	30/3.20	7/3.20	241.3	56.3	297.6	22.40	88.6	0.1154	1068.1	152	73.9	3.7	15.3	1242
300	26/3.83	7/2.98	299.5	48.8	348.4	24.26	92.5	0.0944	1175.3	152	69.0	3.7	16.9	1410
400	26/4.42	7/3.44	398.9	65.1	464.0	28.00	120.6	0.0708	1565.5	152	69.0	3.7	16.9	1709
630	48/4.12	7/3.20	639.9	56.3	696.2	34.32	151.3	0.0450	2169.9	152	63.1	3.7	19.2	2293

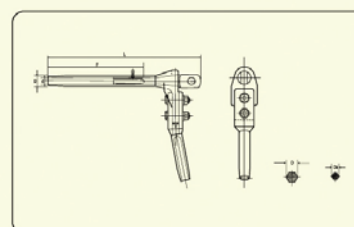
Super Thermal-Resistant Aluminum Alloy Conductors, Aluminum Clad Invar (14%IACS) Reinforced

Spec mm ²	Structure n/mm		Count section mm ²			Diameter mm	Break Load KN	20°C DC Resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient *10 ⁻⁶ /°C		Current Carrying Capacity A 210°C
	Aluminum Alloy	Aluminum Clad Invar	Aluminum Alloy	Aluminum Clad Invar	Total					Aluminum Clad Invar	Conductor	Aluminum Clad Invar	Conductor	
185	30/2.80	7/2.80	184.7	43.1	227.8	19.60	71.6	0.1530	832.5	152	76.8	3.7	14.9	1036
240	30/3.20	7/3.20	241.3	56.3	297.6	22.40	90.9	0.1171	1087.4	152	76.8	3.7	14.9	1238
300	26/3.83	7/2.98	299.5	48.8	348.4	24.26	94.0	0.0954	1192.0	152	71.1	3.7	16.5	1406
400	26/4.42	7/3.44	398.9	65.1	464.0	28.00	123.3	0.0716	1587.7	152	71.1	3.7	16.5	1704
630	48/4.12	7/3.20	639.9	56.3	696.2	34.32	153.5	0.0452	2189.1	152	64.3	3.7	18.9	2288

ACCESSORY FITTINGS

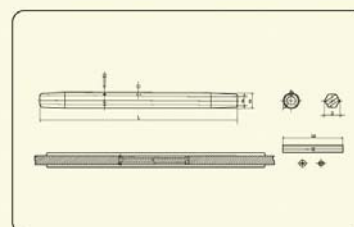
Compacted Suspension Clamp

Conductor Application		Dimension (mm)				
		L	D	d	F	Ds
NY-185BR	185mm ²	470-520	36-40	18-22	160-170	16-20
NY-240BR	240mm ²	505-560	40-44	22-26	175-185	20-24
NY-300BR	300mm ²	530-600	46-50	25-29	190-200	20-24
NY-400BR	400mm ²	620-680	50-54	31-35	195-205	22-26
NY-630BR	630mm ²	710-740	66-70	34-38	225-235	24-28



Compacted Connected Sleeve

Conductor Application		Dimension (mm)			
		L	D	d	Ds
JYD-185BR	160mm ²	550-640	36-40	18-22	160-200
JYD-240BR	240mm ²	590-690	40-44	22-26	180-220
JYD-300BR	300mm ²	650-750	46-50	25-29	180-220
JYD-400BR	400mm ²	810-910	50-54	28-32	220-260
JYD-630BR	630mm ²	940-1040	66-70	34-38	260-300



GAP TYPE UP-RATING CONDUCTOR (GZTACSR)

■ Application

Overhead transmission line bottle-neck project

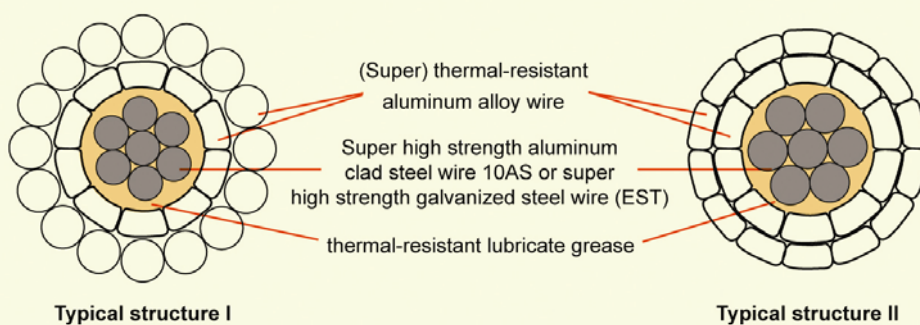
■ Standard

Q/320623 AP 35

■ Structure

Core wire: super high strength galvanized steel core or
super high strength aluminum clad steel core

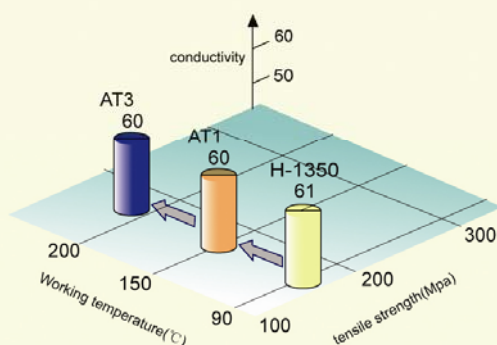
Conductor: (Super) thermal-resistant aluminum alloy wire



■ Characteristics

- The optical fiber get excess length in the tube by loose tube technique.
- Gap type up-rating conductor transfer tension using gap structure.
- No need for adjustment or reinforcement to existing towers.
- Transfer tension by using innovative stringing technology.
- Installation construction is easily mastered through training.

Thermal-resistant Aluminum Alloy Conductor

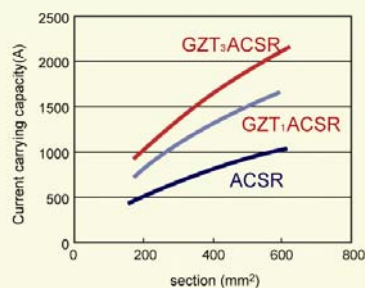


- AT1 and AT3 increases the thermal-resistance character by adding zirconium, AT1 and AT3 keeps tensile strength under high temperature.
- Contrast the performance of (super) thermal-resistance aluminum alloy conductor and H-1350 wire.

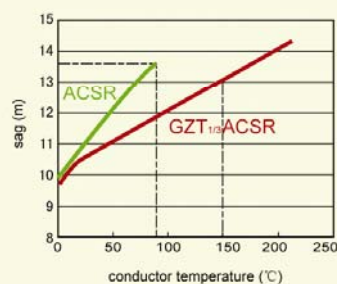
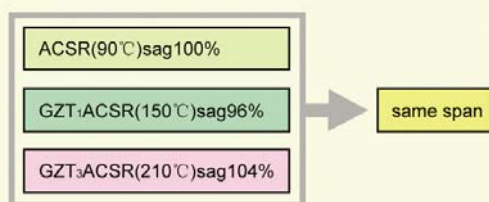
Material	Performance Parameter				
	Tensile Strength (MPa)	Linear Expansion Coefficient (10 ⁻⁶ /°C)	Conductivity (%ACS)	Working Temperature (°C)	Current Carrying Capacity Time
H-1350	162	1.7	61	90	1
AT1	162	1.7	60	150	1.6
AT3	162	1.7	60	210	2.0

Current Carrying Capacity Time

- Gap type thermal-resistance aluminum alloy conductor's current carrying capacity under 150°C is 1.6 times ACSR under 90°C.
- Gap type thermal-resistance aluminum alloy conductor's current carrying capacity under 210°C is 2.0 times ACSR under 90°C.



Sag



PARAMETER

■ Gap Type Up-rating Conductor, (EST) Super High Strength Galvanized Steel Reinforced

Spec mm ²	Section mm ²		Gap mm	Diameter		Break load KN		DC Resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient *10 ⁻⁶ /℃		Current Carrying Capacity A	
	Aluminum Alloy	Steel		Structure I	Structure II	Conductor	Steel Core			Conductor	Steel Core	Conductor	Steel Core	AT1 150℃	AT3 210℃
185	197.6	31.67	1.2	19.7	18.7	80.7	49.1	0.1483	801	73.6	190	18.9	11.5	879	1095
240	250.6	31.67	1.2	21.5	20.6	89.2	49.1	0.1170	948	70.1	190	19.5	11.5	1017	1270
300	290.2	43.11	1.2	23.5	22.4	113.2	66.8	0.1010	1147	72.5	190	19.1	11.5	1126	1409
400	408.3	49.48	1.2	27.4	26.1	142	76.7	0.0718	1523	69.6	190	19.6	11.5	1403	1762
500	523.5	63.55	1.2	31.2	29.5	179.1	95.3	0.056	1951	69.6	190	19.6	11.5	1655	2087
600	642.7	52.8	1.2	34.0	32.0	184.7	81.9	0.0456	2195	65.3	190	20.5	11.5	1887	2386

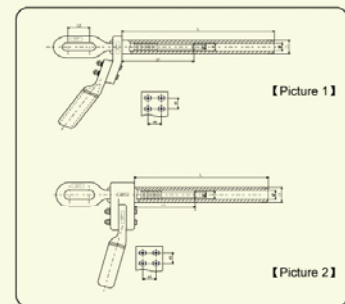
■ Gap Type Up-rating Conductor, (EST) Super High Strength Aluminum Clad Steel (10AS) Reinforced

Spec mm ²	Section mm ²		Gap mm	Diameter		Break load KN		DC Resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient *10 ⁻⁶ /℃		Current Carrying Capacity A	
	Aluminum Alloy	Steel		Structure I	Structure II	Conductor	Steel Core			Conductor	Steel Core	Conductor	Steel Core	AT1 150℃	AT3 210℃
185	197.6	31.67	1.2	19.7	18.7	80.7	49.1	0.1444	793	73.6	73.6	190	11.5	891	1110
240	250.6	31.67	1.2	21.5	20.6	89.2	49.1	0.1145	941	70.2	70.2	190	11.5	1028	1284
300	290.2	43.11	1.2	23.5	22.4	113.2	66.8	0.0985	1137	72.5	72.5	190	11.5	1141	1427
400	408.3	49.48	1.2	27.4	26.1	142	76.7	0.0703	1511	69.6	69.6	190	11.5	1421	1785
500	523.5	63.55	1.2	31.2	29.5	179.1	95.3	0.0549	1937	69.6	69.6	190	11.5	1672	2108
600	642.7	52.8	1.2	34.0	32.0	184.7	81.9	0.0456	2185	65.3	65.3	190	11.5	1899	2402

ACCESSORY FITTINGS

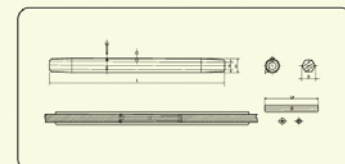
■ Compacted Suspension Clamp

Type	Diameter	Main Size							Picture Number
		L	L1	L2	D	Φ	Φ1	d	
NY-185ST	19.7	400-520	150-250	50-60	30-38	20-21	7.5-8.0	18-19	1
NY-240ST	23.1	500-600	150-250	50-60	35-42	23-25	7.5-8.0	18-19	1
NY-300ST	23.5	500-600	150-250	50-60	35-42	24-26	7.5-8.0	18-19	1
NY-400ST	27.6	550-650	150-250	60-80	38-50	28-29	8.0-9.8	19-20	1
NY-500ST	31.2	600-700	150-250	60-80	40-55	31-33	8.0-9.8	19-20	2
NY-630ST	34.2	600-700	150-250	60-80	42-58	34-36	8.0-9.8	19-20	2



■ Compacted Connected Sleeve

Type	Diameter	Main Size					
		D	d	L	L1	Φ	Φ1
JYD-185ST	19.7	30-38	18-19	550-650	70-80	16-18	12
JYD-240ST	23.1	35-42	18-19	600-700	80-100	20-22	14
JYD-300ST	23.5	35-42	18-19	600-700	80-100	20-22	14
JYD-400ST	27.6	38-50	19-20	700-800	100-120	24-26	15
JYD-500ST	31.2	40-55	19-20	800-900	100-120	26-28	17
JYD-600ST	34.2	42-58	19-20	850-950	100-120	24-26	15.5



ALL ANNEALED ALUMINUM UP-RATING CONDUCTOR (ZTACSS)

■ Application

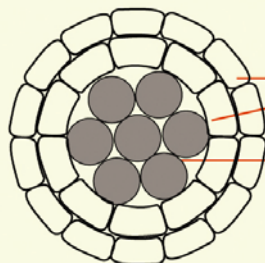
- Transform the line , reduce the loss and increase the capacity
- Reduce the loss in the capital construction line, satisfy the demand of N-1 rule

■ Standard

ASTM856 ASTM857
Q/320623 AP 32

■ Structure

Core wire: super high strength galvanized conductor EST or
super high strength aluminum clad steel wire
conductor: 1350-O type all annealed soft aluminum wire



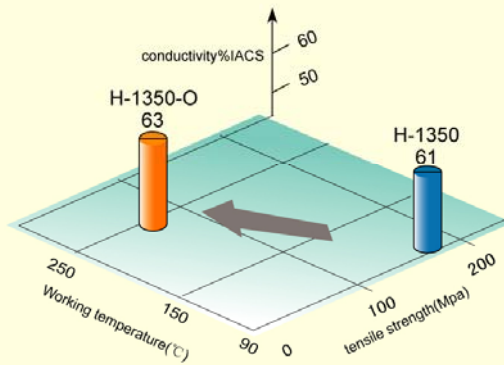
all annealed aluminum wire

Super high strength galvanized steel
wire EST or super high strength
aluminum clad steel wire 10AS

■ Characteristics

- Uses all annealed Aluminum conductor in the capital construction line to reduce the loss of about 3.2% in long-term and satisfy safe running of N-1 rule.
- The current capacity of soft Aluminum conductor of same cross-section used in the transform line is the 1.5 times of normal ACSR .
- No need for adjustment or reinforcement to existing towers.
- Installation construction is easily mastered through training.

■ All Annealed Aluminum Wire

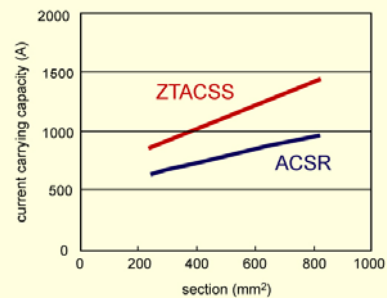


- The conductivity: 63% IACS, which is 2% IACS higher than normal hard Aluminum.
- The permissible constant working temperature is 250°C.
- The aluminum wire have low stress and good stress metastasis performance.
- The performance comparison of all annealed Aluminum wire and normal hard Aluminum.

Performance	Soft Aluminum Wire	Hard Aluminum Wire
Tensile Strength (Mpa)	59—76	160—200
Extend Rate (%)	20—30	1.2—2.0
Conductivity (%IACS)	63	61

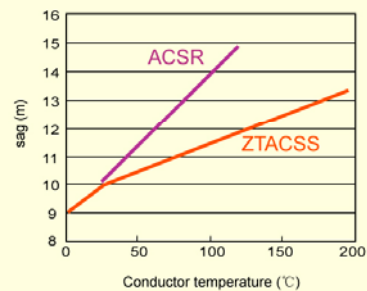
■ Current Carrying Capacity

- The current carrying capacity can reach 1.5 times when the low sag all annealed Aluminum conductor keep. The same sag with the normal Aluminum clad steel wire 70°C with the same cross section.



■ Sag

- The low sag all annealed Aluminum conductor keep the same sag with the Aluminum clad steel wire 70°C of same type by new technology ,when the capacity of the conductor is 1.5 times.



PARAMETER

All Annealed Aluminum Conductor, EST Super High Strength Galvanized Steel Reinforced (Same Section)

Spec	Conductor Structure		Section mm ²		Diameter mm	Break Load KN		DC Resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient ×10 ⁻⁶ /℃		Current Carrying Capacity A	
	Aluminum Number	Steel Number	Aluminum	Steel		Conductor	Steel Core			Conductor	Steel Core	Conductor	Steel Core	100℃	150℃
240/40	18	7	241	31.67	19.8	63.5	49.1	0.1158	920	70.7	190	19.4	11.5	720	998
300/40	18	7	304.4	40.67	22.3	81.3	63	0.0917	1169	70.9	190	19.4	11.5	834	1162
400/50	20	7	402.7	52.2	25.6	105	80.8	0.0693	1518	70.5	190	19.4	11.5	991	1387
400/65	20	7	402.7	65.4	26	125.6	101.4	0.0693	1622	73.9	190	18.9	11.5	998	1398
500/65	21	7	498.9	65.4	28.5	131.4	101.4	0.0560	1906	70.7	190	19.4	11.5	1142	1607
630/80	39	19	634	82.4	32.2	165.8	127.7	0.0440	2417	70.5	190	19.4	11.5	1313	18813

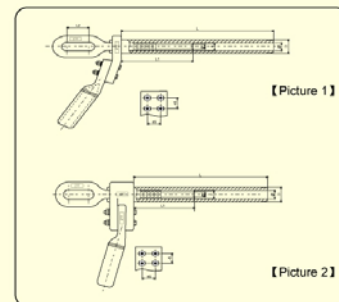
All Annealed Aluminum Conductor, EST Super High Strength Galvanized Steel Reinforced (Same Diameter)

Spec	Conductor Structure		Section mm ²		Diameter mm	Break Load KN		DC Resistance Ω/km	Weight kg/km	Modulus Of Elasticity Gpa		Linear Expansion Coefficient ×10 ⁻⁶ /℃		Current Carrying Capacity A	
	Aluminum Number	Steel Number	Aluminum	Steel		Conductor	Steel Core			Conductor	Steel Core	Conductor	Steel Core	100℃	150℃
285/38	18	7	286	37.74	21.6	75.7	58.5	0.0976	1083	70.7	190	19.4	11.5	802	1115
350/55	20	7	350	56.3	24.2	108.3	87.3	0.0798	1404	73.7	190	18.9	11.5	915	1279
440/58	20	7	441	58.07	26.8	116.5	90	0.0633	1685	70.7	190	19.4	11.5	1056	1482
465/62	20	7	466	62.44	27.6	124.8	96.8	0.0598	1793	70.9	190	19.4	11.5	1095	1539
550/72	36	19	550	72.23	30	144.9	70.7	0.0508	2100	70.7	190	19.4	11.5	1216	1715
690/91	39	19	689	91.78	33.6	183.6	142.3	0.0405	2642	70.9	190	19.4	11.5	1403	1989

ACCESSORY FITTINGS

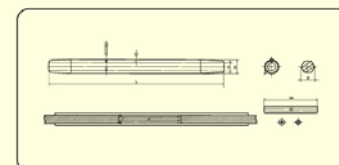
Compacted Suspension Clamp

Type	Diameter	Main Size							Picture Number
		L	L1	L2	D	Φ	Φ1	d	
NY-240/40R	20.10	500-600	200-250	50-60	36-45	24-26	14-15	23-24	1
NY-300/40R	22.60	500-600	200-250	70-80	40-50	25-27	14-15	25-26	1
NY-350/55R	24.20	520-620	250-300	70-80	40-55	25-27	16-17	26-29	1
NY-400/50R	25.10	550-650	250-300	70-80	45-55	28-30	14-15	28-29	1
NY-400/65R	25.70	550-650	280-330	70-80	45-55	29-31	18-19	29-30	1
NY-500/65R	28.70	600-700	280-350	70-80	50-60	33-34	18-19	33-34	2
NY-630/80R	32.00	700-800	300-400	80-90	60-70	37-38	22-23	37-38	2



Compacted Connected Sleeve

Type	Diameter	Main Size					
		D	d	L	L1	Φ	Φ1
JYD-240/40R	20.10	36-45	23-24	550-650	100-150	18-20	13
JYD-300/40R	22.60	40-50	25-26	600-700	100-150	20-22	13.3
NY-350/55R	24.20	40-55	25-27	600-700	100-150	20-22	15
JYD-400/50R	25.10	45-55	28-29	700-800	120-170	24-26	15.4
JYD-400/65R	25.70	45-55	29-30	700-800	120-170	26-28	17.2
JYD-500/65R	28.70	50-60	33-34	750-850	120-170	30-32	17.2
JYD-630/80R	32.00	60-70	37-38	850-950	120-170	32-34	19.3





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