住友電工

GTACSR

Gap type thermal-resistant aluminum alloy conductor steel reinforced

GZTACSR

Gap type super thermal-resistant aluminum alloy conductor steel reinforced

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GTACSR/GZTACSR has a unique construction featuring a small gap between the steel core and (Super) Thermal-resistant aluminum alloy layer. The combination of the (Super) Thermal resistant aluminum alloy and the "Gap construction" offers excellent sag and current-carrying characteristics.
With this advantage, GTACSR/GZTACSR is useful to up-rate an existing transmission line by simply replacing the existing conductor to GTACSR/GZTACSR.

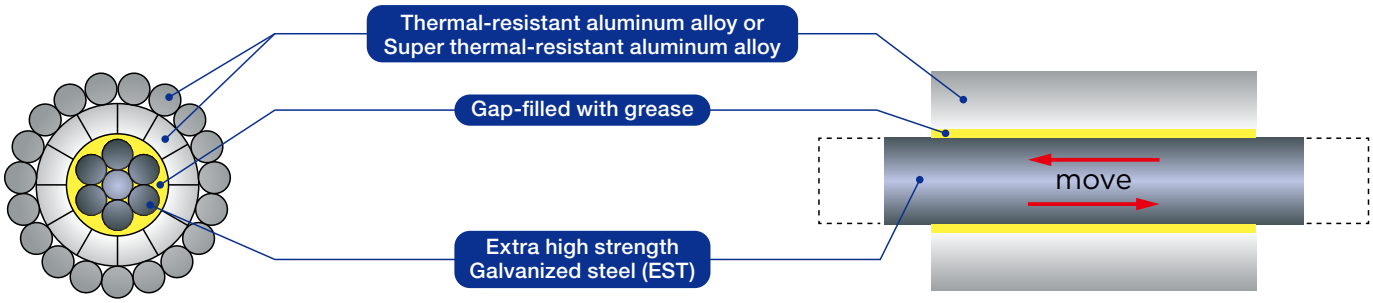
Advantage

- **Double*1 the current-carrying capacity for the same size conductor.**
- **No modification or reinforcement required for existing towers.**
- **Low cost and short construction period.**

*1 TAI (Thermal-resistant aluminum alloy) - 1.6 times current capacity
ZTAI (Super thermal-resistant aluminum alloy)- Double current capacity

Construction

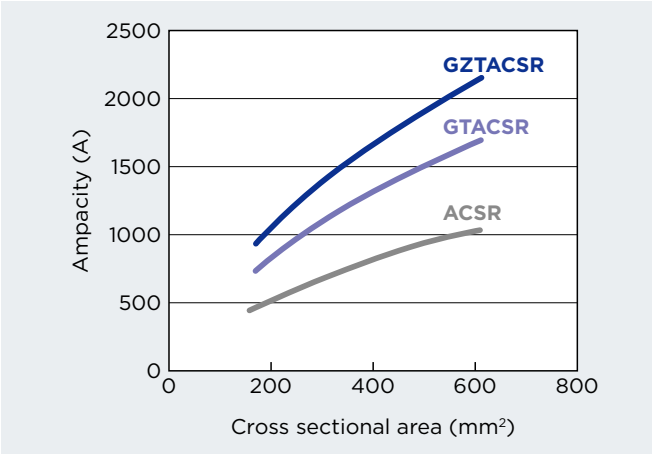
Extra high strength steel core is in the center and (Super) Thermal-resistant aluminum alloy is supplied in conductor part. To maintain the gap between the steel core and aluminum inner layer, the inner layer wires are trapezoid shaped. The thermal-resistant grease is filled to the gap to avoid friction between the steel core and aluminum inner layer. The aluminum layer and steel core move independently.



Feature

Ampacity

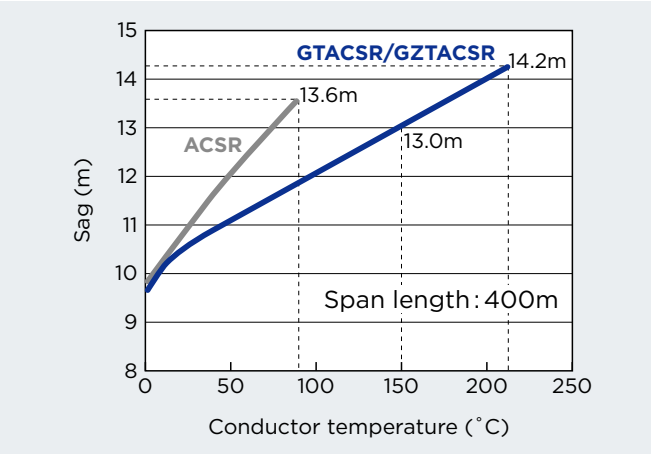
GTACSR can carry 1.6 times higher current than ACSR of equivalent size.
GZTACSR can carry 2 times higher current than ACSR of equivalent size.



Sag

GTACSR sag (at 150˚C) : 96%
GZTACSR sag (at 210˚C) : 104%
Maintain clearance

Note:ACSR (sag at 90˚C) : 100%



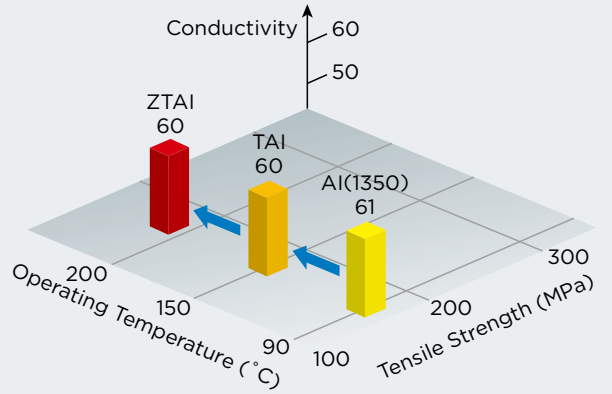
GTACSR

Gap type thermal-resistant aluminum alloy conductor steel reinforced

GZTACSR

Gap type super thermal-resistant aluminum alloy conductor steel reinforced

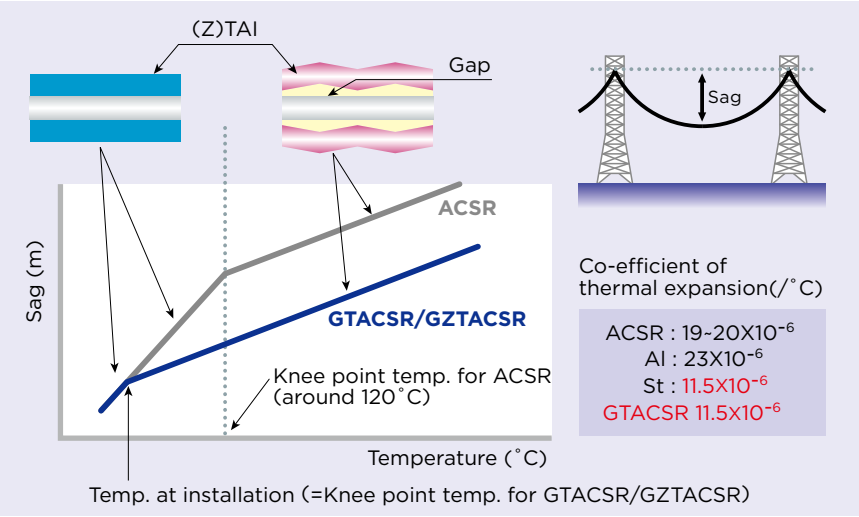
(Super) Thermal resistant aluminum alloy [TAI, ZTAI]



Thermal-resistant aluminum alloy (TAI) and Super thermal-resistant aluminum alloy (ZTAI) improve its thermal-resistant characteristics by adding zirconium. ZTAI and TAI can keep its tensile strength in high temperature condition.
TAI can withstand up to 150˚C and can carry 1.6 times current of Hard drawn aluminum (1350).
ZTAI can withstand up to 210˚C and can carry 2.0 times current of Hard drawn aluminum (1350).
Both TAI and ZTAI maintain nearly the same mechanical and electrical characteristics as Hard drawn aluminum (1350).

Material	Properties (ϕ3.2mm)				
	Tensile strength (MPa)	Elongation (%)	Conductivity (%)	Operating temp.(˚C)	Current capacity
EC(HAI)	Min.162	Min.1.7	Min.61	Min.90	1
TAI	Min.162	Min.1.7	Min.60	Min.150	1.6
ZTAI	Min.162	Min.1.7	Min.60	Min.210	2.0

Principal behind small sag



At the time of sagging, all tension is applied to the steel core by a special stringing method. As a result, the thermal expansion characteristics of GTACSR/GZTACSR become that of steel core. The thermal expansion coefficient of steel core is 11.5X10^{-6}(/˚C).
and it is approximately half of normal ACSR (around 20X10^{-6}(/˚C)).
GTACSR/GZTACSR has better thermal expansion characteristics than conventional ACSR.
So GTACSR/GZTACSR can maintain small sag in high temperature condition.

Accessories

- The size of dead-end clamp for GTACSR/GZTACSR is slightly larger than conventional ACSR allowing it to carry large current.
- Other accessories are same as conventional ACSR*2.

In case of replacing an existing transmission line, only compression type dead-end clamp should be changed.
Other accessories can be re-used.

*2 In case suspension tower continues more than six spans, special semi-strain assembly is required.

Installation

Installation method of GTACSR/GZTACSR is basically the same as conventional ACSR.
Only at the time of sagging, a special sagging method is required to apply all the tension to the steel core.
SEI can dispatch a skilled supervisor for assistance in the installation work.

Design

GTACSR/GZTACSR can be designed to have the same mechanical characteristics as existing ACSR. Design examples are shown below.

Size		mm^2	185	240	265	310	370
Equivalent conductor			Lynx	Hawk	Hen	Goose	Redwing
Stranding	(Z)TAI	No/mm	14/ TZ*1(3.23) 10/TZ(2.98)	15/ TZ(3.46) 10/TZ(3.69)	19/3.1 10/TZ(3.94)	16/3.9 10/TZ(3.94)	17/4.15 12/TZ(3.83)
	Est		7/2.0	7/2.4	7/2.8	7/2.8	7/3.8
Rated tensile strength		kN	62.4	86.8	107.5	113.8	179.5
Diameter	GTACSR/GZTACSR	mm	17.8	20.6	22.6	24.4	27.3
	Steel core		6.0	7.2	8.4	8.4	11.4
Cross sectional area	Aluminum	mm^2	184.5	247.9	265.3	313.1	368.2
	Steel core		21.99	31.67	43.11	43.11	79.38
	Total		206.5	279.6	308.4	356.2	447.6
Weight	Aluminum	kg/km	700.3	955.9	1098	1227	1666
D.C.Resistance at 20˚C		Ω/km	0.160	0.119	0.111	0.0941	0.0798
Current carrying capacity*2	GTACSR(150˚C)	A	713	863	919	1021	1147
	GZTACSR(210˚C)		871	1058	1128	1255	1414
Modulus of elasticity	GTACSR/GZTACSR	GPa	77.1	78.1	81.9	79.2	87.4
	Steel core		205.9	205.9	205.9	205.9	205.9
Coefficient of linear expansion	GTACSR	10^{-6}/˚C	19.7	19.6	19.0	19.4	18.2
	Steel core		11.5	11.5	11.5	11.5	11.5

Size		mm^2	410	413	520	620
Equivalent conductor			Condor	Drake	-	-
Stranding	(Z)TAI	No/mm	15/4.6 10/TZ(4.55)	16/4.4 10/TZ(4.65)	18/TZ(4.01) 14/TZ(3.96) 10/TZ(3.88)	16/TZ(4.80) 12/TZ(4.75) 12/TZ(3.47)
	Est		7/3.0	7/3.2	7/3.0	7/3.2
Rated Tensile Strength		kN	138.1	149.2	152.9	178.3
Diameter	GTACSR/GZTACSR	mm	27.6	27.8	29.0	31.5
	Steel core		9.0	9.6	9.0	9.6
Cross sectional area	Aluminum	mm^2	411.9	413.2	518.0	615.7
	Steel core		49.48	56.29	49.48	56.29
	Total		461.4	469.5	567.5	672.0
Weight	Aluminum	kg/km	1557	1616	1856	2179
D.C.Resistance at 20˚C		Ω/km	0.0714	0.0714	0.0570	0.0478
Current carrying capacity*2	GTACSR(150˚C)	A	1257	1219	1356	1516
	GZTACSR(210˚C)		1500	1503	1667	1866
Modulus of elasticity	GTACSR/GZTACSR	GPa	77.3	79.1	74.4	73.5
	Steel core		205.9	205.9	205.9	205.9
Coefficient of linear expansion	GTACSR	10^{-6}/˚C	19.7	19.4	20.2	20.3
	Steel core		11.5	11.5	11.5	11.5

*1: TZ: Trapezoid wire
*2: Ambient temp.: 40 degree C, Wind 0.5m/sec, Wind direction: 45degree,
Solar radiation: 0.1W/cm^2, Absorptivity & Emmisivity of conductor surface: 0.5

Supply record

GTACSR/GZTACSR was developed 45 years ago and have been supplied more than 27,000km (up to July 2016). GTACSR/GZTACSR has been used not only in Japan but also in the world. GTACSR/GZTACSR have been supplied to more than 25 countries.

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Printed in Japan EDO03(2016.07)