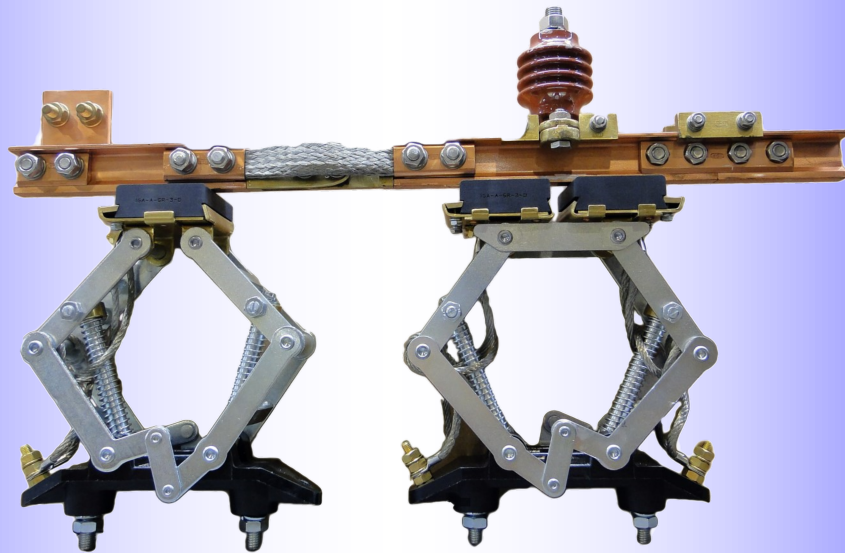




Industrias GALARZA, S.A.[®]

Leaders in electrical conductivity since 1958

CATALOGUE 2020



TRACK PROFILE

DESCRIPTION

SERIES



CONTACT POWER LINES

LEC





Generalities

The supply of the products contained in this catalogue is subject to the conformity of the tariff in force at the moment and the terms contained in these General Conditions of Sale and Guarantees.

Orders and prices

All orders received by IGA will be confirmed via fax or email. If in the following 24 hours IGA does not receive any claim, they will be considered definitive. IGA reserves the right to accept or reject any order.

Codes

The codes indicated in this catalogue are the standard products of IGA.

Delivery time

If for reasons beyond our control we can not fulfill this service commitment, IGA will inform the customer of the new term within a maximum of 48 hours after the reception of the order.

The rest of references will be served in the shortest period of time possible and may make partial deliveries.

Orders received that have a delivery time less than 72 hours, will follow the procedure described above. The breach of the previous commitment or a fractioned issue will not be grounds for compensation.

Transport

Our products are considered expired in our warehouse and the date of issue is shown on the delivery note.

The goods travels at the addressee expense and risk, even if they are sent prepaid.

In the case of lack of packages or visible damages due to transportation, the addressee must write it down on the delivery note, claim the carrier and inform the commercial department of IGA within 48 hours. Otherwise, it will be considered the conformity of the goods in quantity and condition . Claims for delays in transportation will not be accepted.

After 8 days from receipt of the goods, no claims will be accepted about the contents of the boxes.

Refunds

The products invoiced by IGA are considered a firm sale and has no right to refund.

In case of an error in the execution of the order, the following shall be taken into account:

-The change must be authorized by the commercial direction of IGA. The warehouse of IGA will not accept any product without authorization.

-The accepted material will have a 20% reduction of its value for verification expenses.

-The goods returned to IGA travel at the client's risk.

Installations

IGA is exempted from any responsibility in the installations that do not comply with the advice or with the specifications and features of each range of product.

Warranty

IGA range of products has a 2 year warranty. The acknowledgment of the responsibility in warranty corresponds only to IGA and / or to its insurance company. Any other defect caused by aging, corrosion, improper installation or improper application, will not be subject to possible claims.

Jurisdiction

IGA will try to resolve any divergence with his clients through friendly channels. Having said that, in case of litigation, the parties agree and are obliged to submit to the arbitration appointed by the Court of the Arbitration Association of Bilbao, which will be responsible for the administration of the aforementioned arbitration in accordance with its Statute and Regulations. Likewise, they are obliged from now on to comply with the arbitral report that is issued.

IGA reserves the modification of the articles without previous notice.

NOTES OF INTEREST

TRANSPORT

From IGA we offer the possibility of quoting the transport price for the 7 meters length profile by transport agency.



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CONTACT POWER LINES

TECHNICAL INFORMATION

1. APPLICATIONS AND FEATURES

- For high temperatures (+60 °C) and/or amperage (>200 amp)
 - There are 4 track profiles (3 Phases + earth line)
- The earth line is half the section and intensity of the rest of the phases.

2. TECHNICAL INFORMATION

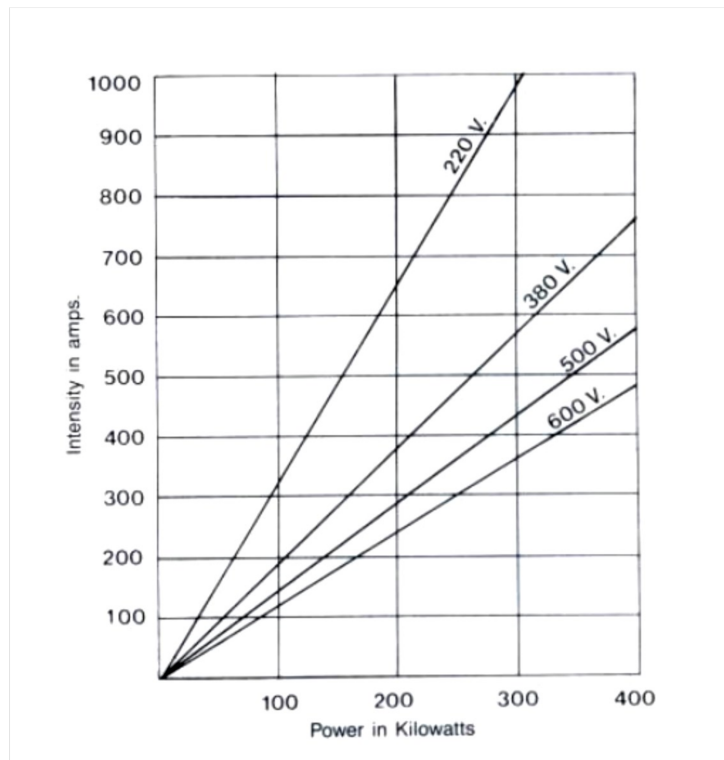
PREVIOUS INFORMATION

- P_{st}: Maximum simultaneous power of the installation (Kilowatts).
- I_{st}: Maximum simultaneous intensity (Amps).
- V: Supply voltage (Volts).
- Q: Position and number of feeding.
- L: Length of installation (Metres).
- ΔU: Maximum permissible voltage drop.
- ED: Duty cycle (normally between 40 and 100%).
- a: Distance between tracks (Milimetres).
- η: Engine performance

SIMULTANEOUS TOTAL INTENSITY

Direct current $I_{st} = \frac{P_{st} \times 1000}{V}$

Alternating current $I_{st} = \frac{P_{st} \times 1000}{1,386 \times V}$

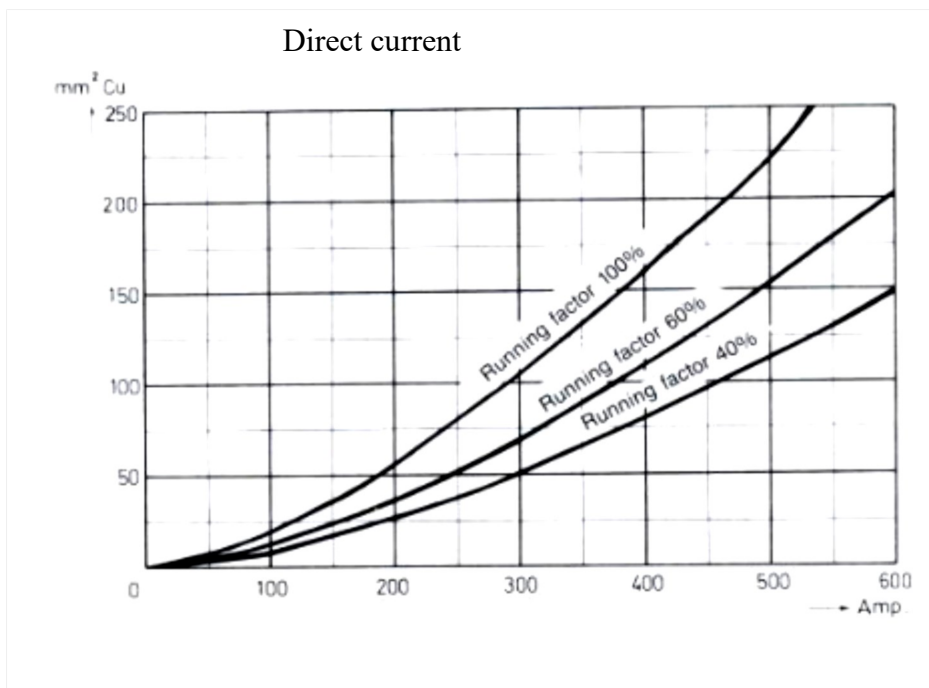
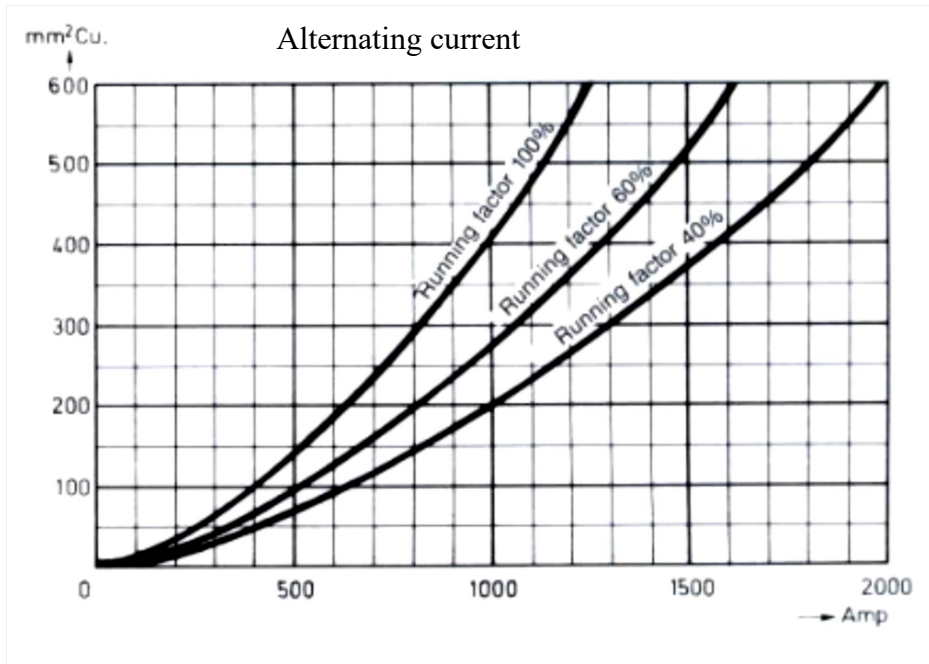




CONTACT POWER LINES

CALCULATION OF THE SECTION

The section would be calculated using the attached graphs based on the duty cycle.
If the working ED is unknown for safety reasons, the estimated value will be taken into account.
The maximum value corresponds to 100% and the minimum to 40%





CONTACT POWER LINES

THERMAL STABILITY

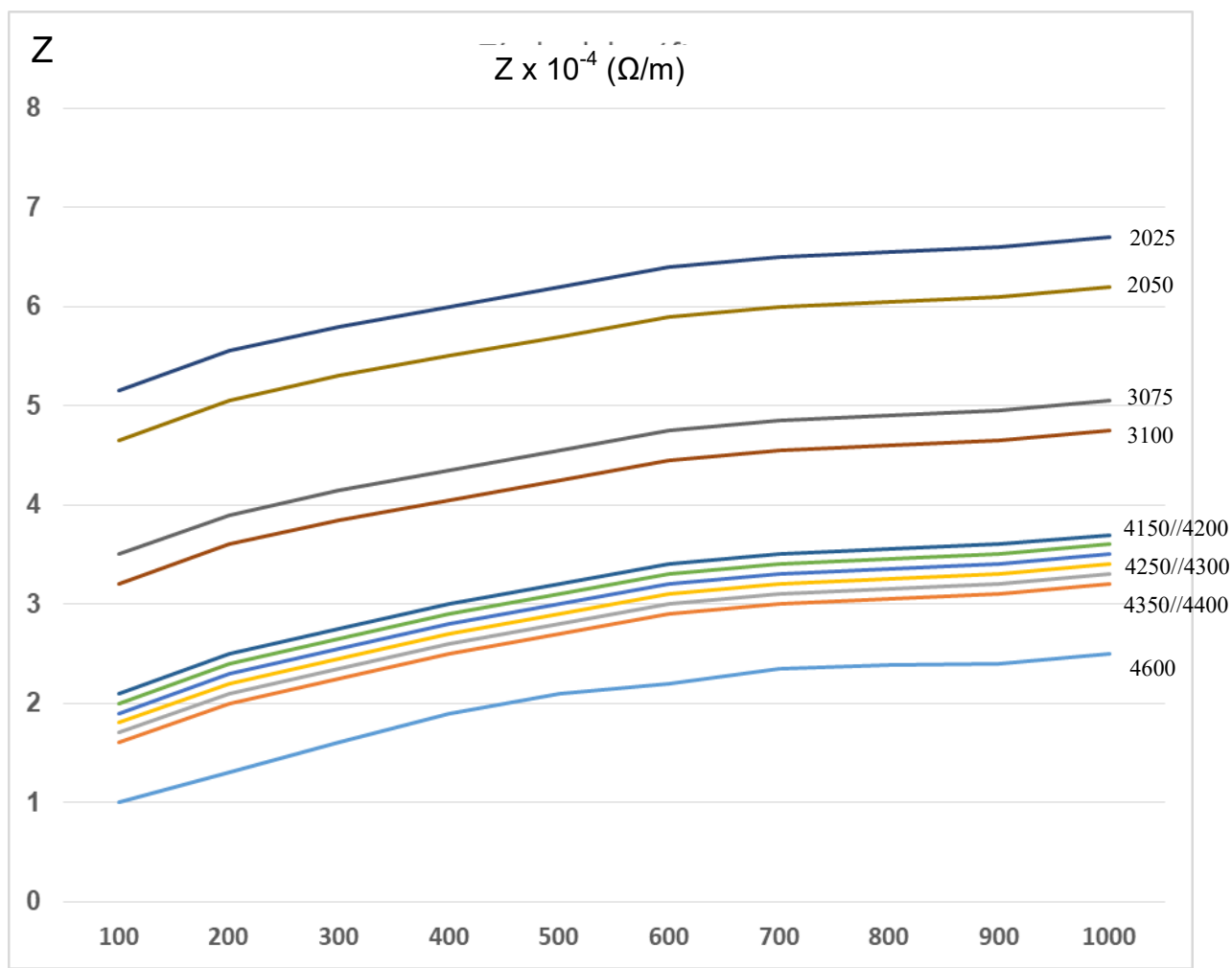
Due to the heating of the conductors, produced by the Joule effect, in view of the thermal stability, it is recommended not to exceed the following values under the permanent consumption regime.

Copper section Up to mm ²	Maximum admissible intensity A. for mm ²	Copper section Up to mm ²	Maximum admissible intensity A. for mm ²
6	9,00	125	3,70
10	8,75	160	3,40
16	7,60	200	3,20
25	6,35	250	2,90
35	5,75	300	2,75
50	5,10	400	2,50
70	4,50	500	2,30
95	4,05	600	2,10

Conductors Type	cooper equivalence CU value (mm ²)
2.000	26
3.000	33
4.000	63
35.000	112

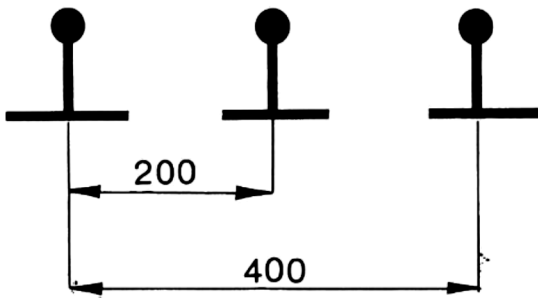
IMPEDANCE Z

Z: resistance of IGA conductive rails, depending on the distance between them.



Distance between conductors in mm.

Example for determining the distance between conductors:



Temperature correction coefficient	
0 °C	0,92
10 °C	0,96
20 °C	1
30 °C	1,04
40 °C	1,08
50 °C	1,12
60 °C	1,16

The distance between conductors is the largest between active lines.

In this example the value will be equal to 400.

TENSION DROP

We calculate the voltage drop:

$$\Delta U = \sqrt{3} \times I \times L \times Z$$

ΔU : Tension drop (Volt.).
 I : Intensity (Amp.).
 L : Length of installation (m.).
 Z : Impedance (Ohm/m.).

$$\Delta V\% = \frac{\Delta U}{U} \times 100$$

U : Tension of the installation (Volt.).

The installation length depends on feed point(s) on the route:

- So, we have for:
- Power supply at one end.....L
 - Central power supply.....L / 2
 - Power supply at both ends.....L / 4
 - Power supply at 1/6 of both ends.....L / 6

We need to get $\Delta U < 3\%$; For that, we might have to:

- 1) Increase the copper section.
- 2) Decrease the distance between conductors.
- 3) Increase the number of line feedings, decreasing L
- 4) Take into account the copper wear due to the use.
- 5) Incorporate compensation cables.

CYLINDRICAL COPPER WIRE

- Vertical and horizontal mounting. Common materials in both types.
- Limited to maximum speed of 120 m/min.
- Maximum conductor diameter: 11 mm.

Tighten the driver with approaching pulley. Final tensión is applied with the strain insulators at the ends.

Do not exceed 1/3 of the driver's traction breakage value at low temperatures.

The support brackets are placed between 5 and 10 meters.

Assemble the outlet 25mm higher than the theoretical center of the conductor, in order to ensure proper contact.

1. COPPER WIRE

CONDUCTOR TYPE	Reference	Cross-section (mm ²)	Diameter (mm)	Weight (gr/m)	Tensile breaking strength (Kg)	Electrical resistance (Ω/m)
	1	28,3	6	254	1.120	6,2 x 10 ⁻⁴
	2	38,5	7	346	1.520	4,6 x 10 ⁻⁴
	3	50,3	8	452	2.200	3,1 x 10 ⁻⁴
	4	63,6	9	572	2.450	2,7 x 10 ⁻⁴
	5	78,5	10	707	2.950	2,2 x 10 ⁻⁴
	6	95,0	11	855	4.320	1,9 x 10 ⁻⁴

2. COMMON ACCESSORIES TO BOTH TYPES OF ASSEMBLY

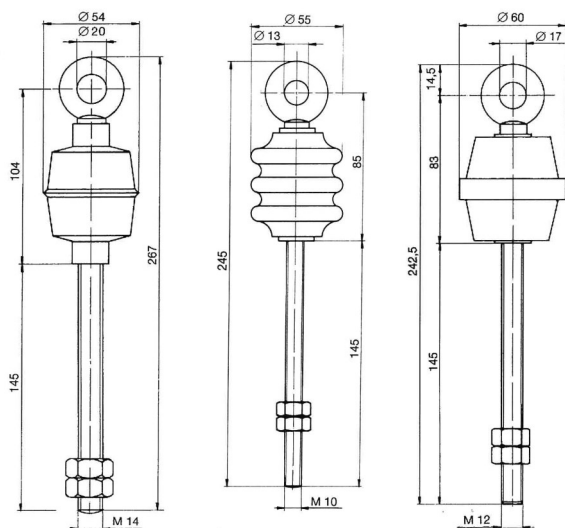
2.1 STRAIN INSULATORS

217 AT 231 AT 253 AT

217 AT

231 AT

253 AT

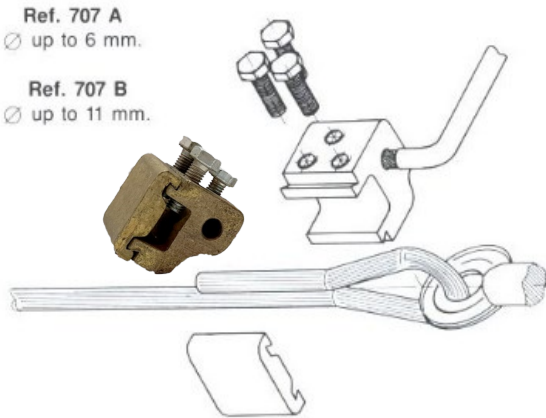


CODE	105001	105002	105003
REFERENCE	217 AT	231 AT	253 AT
WEIGHT (Kg)	0,610	0,450	0,490
Ø Wire to tighten (mm)	15	6	10
Traction breakage (Kg)	4.700	1.500	2.500
Test voltage (KV)	3	5	5



CONTACT POWER LINES

2.2 CLAMP AND POWER FEED



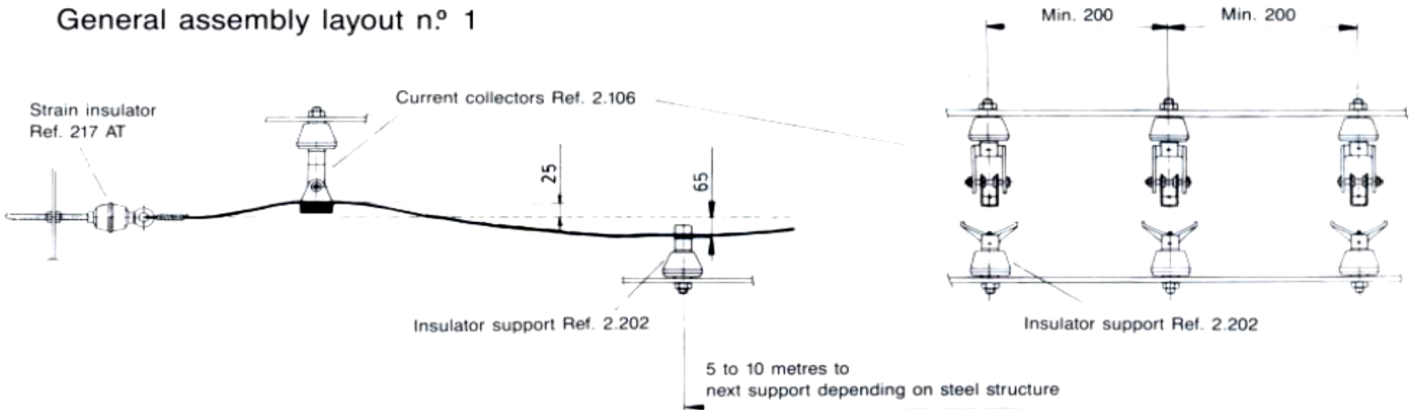
To assemble release dove-tail cover. Insert conductor and end projecting from tensor ring. Fit cover and tighten screws.

Into the hole goes the line power source, which is attached with a single screw.

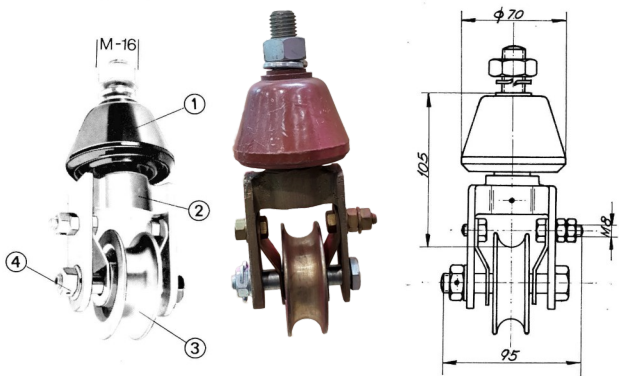
3. HORIZONTAL ASSEMBLY: CURRENT COLLECTOR

General Assembly Layout No. 1

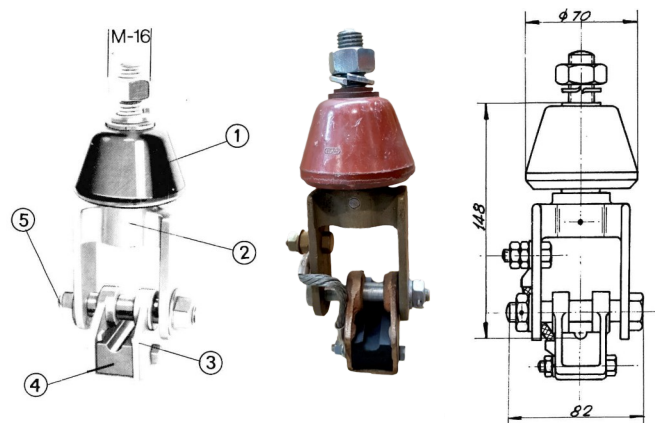
General assembly layout n° 1



3.1 CURRENT COLLECTORS



- Nomenclature:
1. Insulator 213
 2. Support
 3. Wheel P-2
 4. Axle



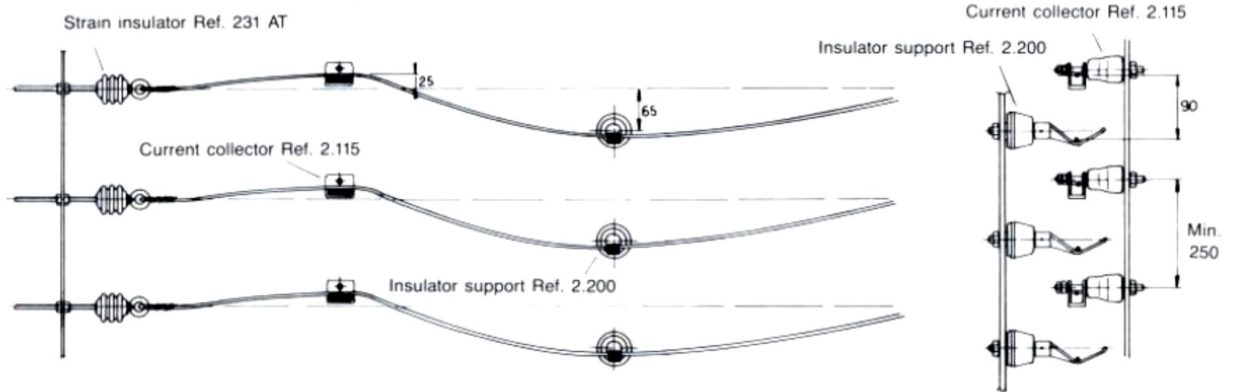
- Nomenclature:
1. Insulator 213
 2. Support
 3. Contact brush carrier
 4. Graphite GL-2
 5. Axle

CODE	201030	201031
REFERENCE	2.105	2.106
Weight (Kg)	1,450	1,280
Capacity (Amp)	75	100
MATERIALS	Replaceable toughened bronze pulley and bush	Replaceable hard graphite contact brush

4. VERTICAL ASSEMBLY: SUPPORTS AND CURRENT COLLECTORS

General Assembly Layout n° 2

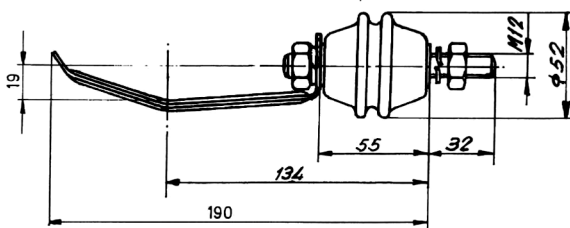
Vertical assembly



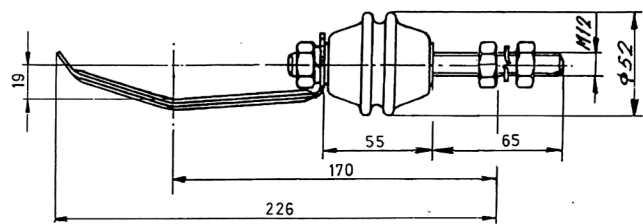
4.1 SUPPORTS



CODE	REFERENCE	WEIGHT (Kg)
201036	2.200-H	0,340
201095	2.200-H (250Mm.65-18)	0,360

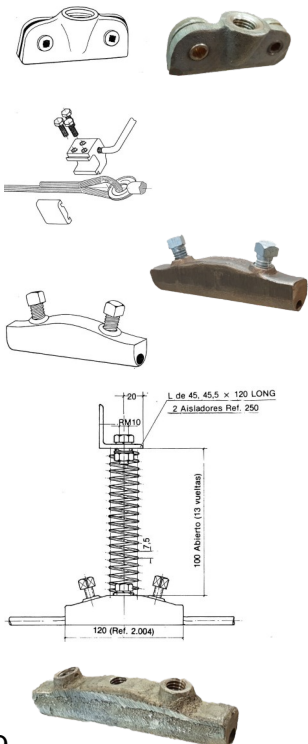


2.200-H



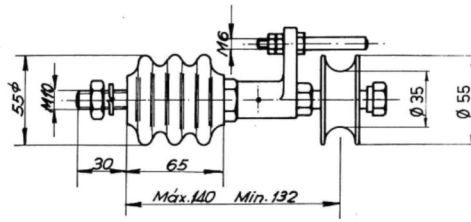
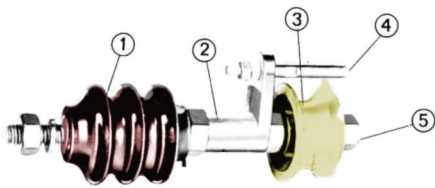
2.200-H (250 Mm.65-18)

4.2 OVERHEAD CLAMPS AND JOINTS

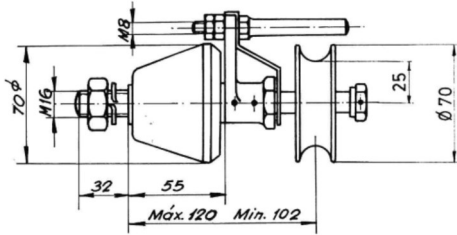


CODE	DENOMINATION	REFER.	Diameter Thread (mm)	Length (mm)	Height (mm)	Thread	Weight (Kg)	MATERIAL
202002	Overhead clamp	501-0-6	6 y 7	72	32	M16	0,160	Brass
202003	Overhead clamp	501-0-8	8 y 9	82	34	M16	0,200	Brass
202004	Overhead clamp	501-0-10	10,11 y 12	83	38	M16	0,230	Brass
202005	Overhead clamp	501-0-13	13, 14 y 15	90	45	M16	0,280	Brass
201007	Mooring staple and feeding	707-A	Up to 6	30	27	-	0,110	Brass
201008	Mooring staple and feeding	707-B	From 6 to 11	47	46	-	0,390	Brass
—	Joint	2004	According to the order	120	30	-	0,360	Bronze
—	Joint set	2005	According to the order	120	150	-	0,700	-

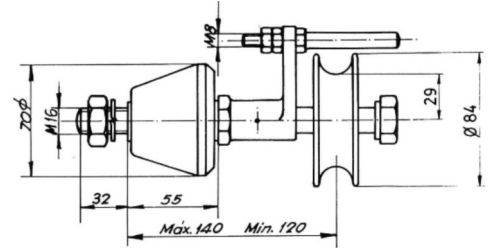
4.3 CURRENT COLLECTORS



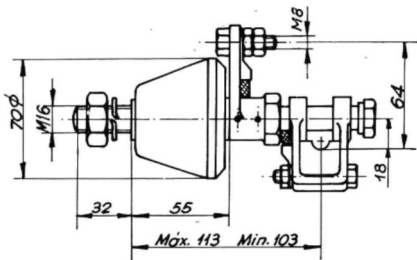
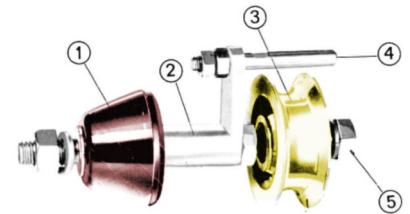
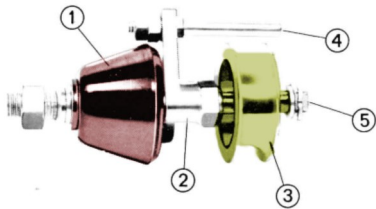
2.100-E



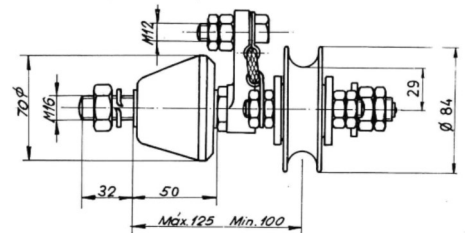
2.101



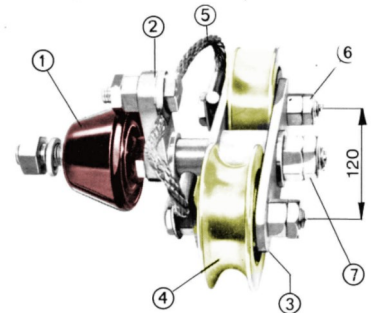
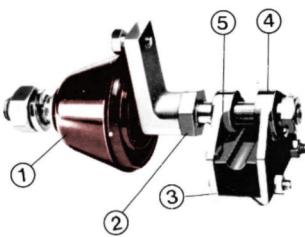
2.101-E



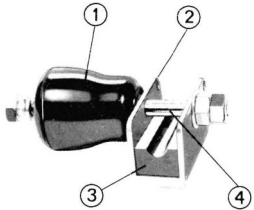
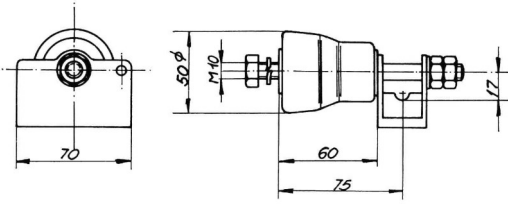
2.102



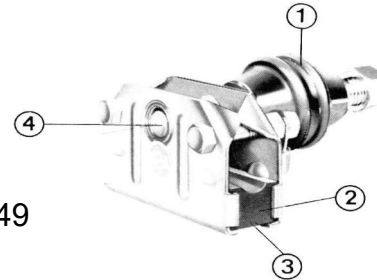
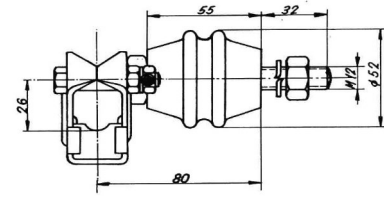
2.104



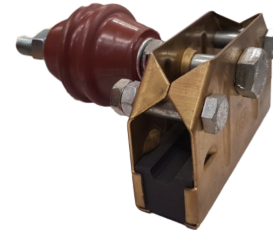
CODE	201025	201026	201027	201028	201029
REFERENCE	2.100-E	2.101	2.101-E	2.102	2.104
WEIGHT (Kg)	0,820	1,100	1,600	0,920	3,450
Capacity (Amp)	50	75	100	100	200
MATERIAL	Replaceable toughened bronze Wheel and bush	Replaceable toughened bronze Wheel and bush	Replaceable toughened bronze Wheel and bush	Replaceable hard graphite contact brush	Replaceable toughened bronze Wheel and bush
COMPONENTS	1. Insulator 231 2. Body support 3. Wheel P-1 4. Stop 5. Axle	1. Insulator 213 2. Body support 3. Wheel P-2 4. Stop 5. Axle	1. Insulator 213 2. Body support 3. Wheel P-3 4. Stop 5. Axle	1. Insulator 213 2. Body support 3. Graphite GL-2 4. Stop 5. Axle	1. Insulator 101 2. Body support 3. Arm 4. Wheel P-3 5. Braided cable 6. Pulley axle 7. Center axis of rotation



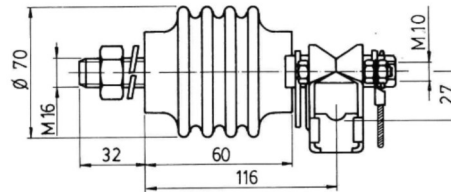
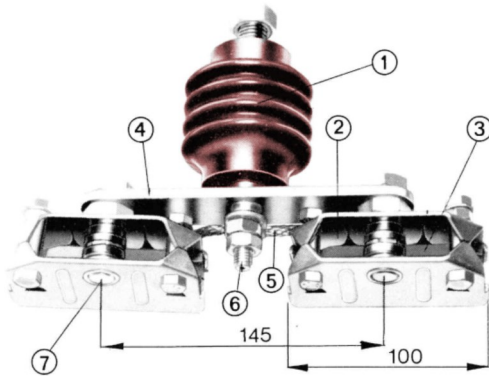
2.115



2.149



2.152



CODE	201032	201034	201035
REFERENCE	2.115	2.149	2.152
Weight (Kg)	0,500	0,610	1,760
Capacity (Amp)	100	150	300
MATERIAL	Replaceable hard graphite contact brush	Replaceable hard graphite contact brush	Replaceable hard graphite contact brush
COMPONENTS	1. Insulator 231 2. Contact brush carrier 3. GL-2 Graphite 4. Axle	1. Insulator 250 2. Contact brush carrier 3. GL-3 Graphite 4. Axle	1. Insulator 219 2. Contact brush carrier 3. GL-3 Graphite 4. Arm 5. Braided cable 6. Central swivel axle 7. Contact brush shaft

TENSIONED SLOTTED COPPER WIRE

1. ASSEMBLY INSTRUCTIONS

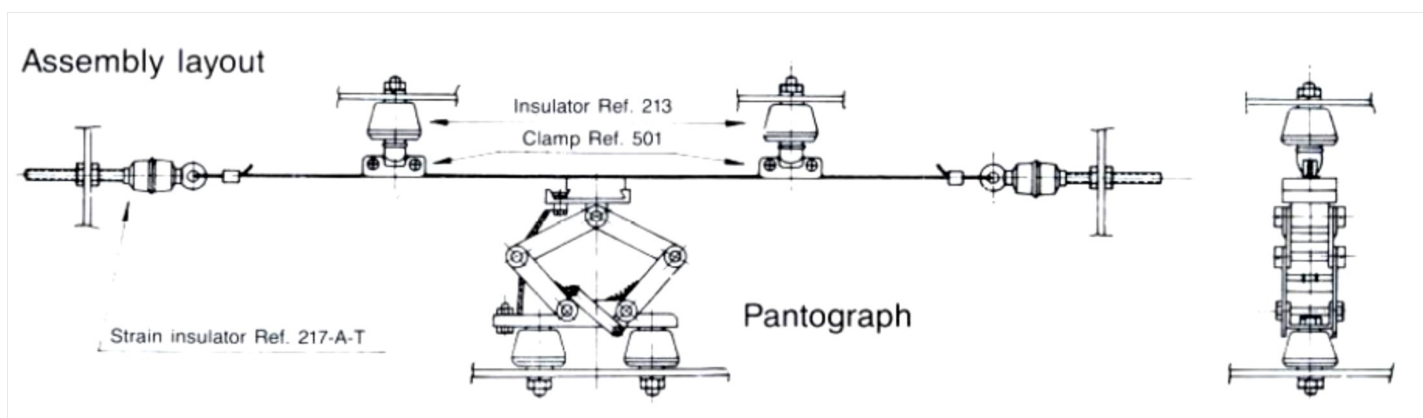
Grooved conductors conceal the connection of the overhead clamp to the contact brush on the current collector, facilitating sliding.

- Place the Overhead clamps with their corresponding insulators every 5 - 10 m.
- The conductor must be unwound without twisting and attached by the clamps.
- Tighten the conductor with pulley and give it the tight finish with the strain insulators
- Do not to exceed 1/3 of breaking strain in low temperaturas.
- Finally tighten the clamps. Minimum conductor spacing 200 mm



The line should be fitted horizontally and it is recommended to assemble it over the centre of the steel structure to prevent the current collector, from becoming loose due to the crane rocking, as the play in its wheels increases. The longer the length of the line, the greater the need to re-tensión the conductor when the temperature first begin to rise.

Before retensioning, the clamp must be loosened.



2. COPPER WIRE

CONDUCTOR TYPE	Reference	Section (mm ²)	Diameter (mm)	Weight (Kg /m)	Breaking strain (Kg)	Electrical resistance (Ω/m)
	1R	24,4	6,0	0,220	910	7,2 x 10 ⁻⁴
	2R	34,0	7,0	0,306	1260	5,1 x 10 ⁻⁴
	3R	53,5	8,6	0,482	1996	3,3 x 10 ⁻⁴
	4R	67,5	10,0	0,607	2516	2,6 x 10 ⁻⁴
	5R	85,1	11,0	0,766	3174	2,1 x 10 ⁻⁴
	6R	107,1	12,2	0,964	3996	1,6 x 10 ⁻⁴

The current collectors used in this type of lines appear later in this catalogue and are reference 2.122, 2.127, 2.139-G, 2.139-P, 2.147-B-G, 2.147-B-P, 2.148-B-P and 2148-B-P.



CONTACT POWER LINES

3. OVERHEAD CLAMPS AND JOINT

	CODE	REF.	APPLICATION	LENGTH (mm)	HEIGHT (mm)	ROSCA	WEIGHT (Kg)	MATERIAL
	203007	501	Suspension	85	39	M16	0,260	Malleable foundry
	203008	502	Suspension	190	52	M16	0,580	Malleable foundry
	203010	601	Joint suspension	250	42	M16	0,590	Bronze
	203014	602	Joint	245	25	—	0,400	Bronze
	203018	604	Female terminal	185	55	—	0,460	Bronze
	203022	605	Male terminal and final anchor	200	55	—	0,500	Bronze
	203026	706	Power feed	187	46	M16	0,600	Bronze
	203009	506	Double conductor suspension	86	42	M16	0,700	Bronze

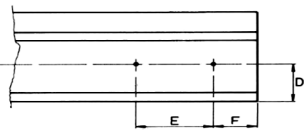
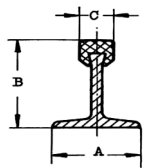
RIGID LINES BASED ON CONDUCTING RAILS

1. CONDUCTING RAILS

Supplied in 7 metres length, with ends drilled for joint.

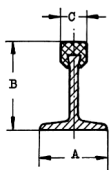


1.1 Copper head rail and steel base



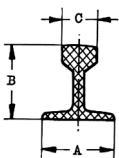
Code	Reference	Dimensions						Section (mm ²)		Weight (Kg/m)
		A	B	C	D	E	F	Cu	Fe	
204373	3.025	30	36,0	8	17,5	35	20	25	200	1,79
204004	3.050	30	38,5	9	17,5	35	20	50	200	2,02
204005	3.075	30	39,0	10	17,5	35	20	75	200	2,25
204006	3.100	30	40,0	12	17,5	35	20	100	200	2,47
204007	4.050	45	49,3	12	22	35	20	50	380	2,94
204008	4.100	45	51,0	14	22	35	20	100	380	3,39
204009	4.150	45	52,2	16	22	35	20	150	380	4,34
204010	4.200	45	54,5	18	22	35	20	200	380	4,80
204011	4.250	45	55,0	19	22	35	20	250	380	5,24
204012	4.300	45	57,5	20	22	35	20	300	380	5,70
204013	4.350	45	58,7	21	22	35	20	350	380	6,14
204014	4.400	45	60,5	22	22	35	20	400	380	6,60
204015	4.500	45	62,5	24	22	35	20	500	380	7,50
204016	4.600	45	66,0	26	22	35	20	600	380	8,40

1.2 Copper head rail and aluminum base



Code	Reference	Dimensions						Section (mm ²)		Weight (Kg/m)
		A	B	C	D	E	F	Cu	Al	
204020	35.030	35	31,6	12	17	30	20	30	250	0,95
204021	35.050	35	33,2	12	17	30	20	50	250	1,12
204023	35.075	35	34,0	15	17	30	20	75	250	1,35
204023	35.100	35	35,7	15	17	30	20	100	250	1,60
204024	35.150	35	35,9	17	17	30	20	150	250	2,00

1.3 Rail all copper (corrosive environments, shipyards, etc.)

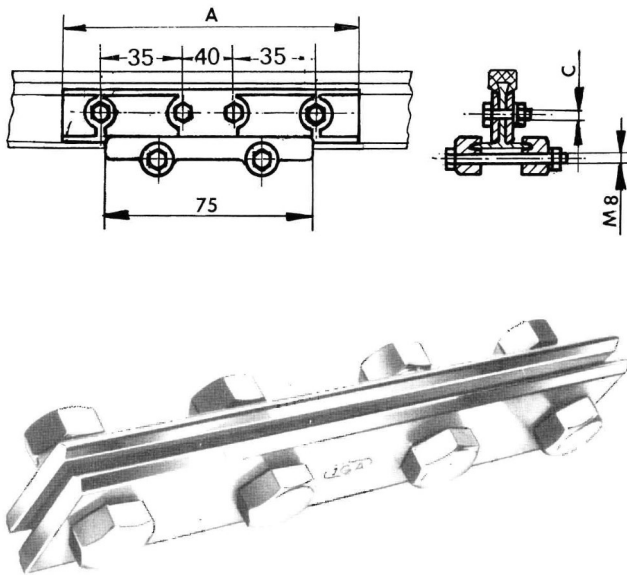


Code	Reference	Dimensions						Section (mm ²)		Weight (Kg/m)
		A	B	C	D	E	F	Cu	-	
	3.000-310	30	40,0	12	17	35	20	310	-	2,78
	4.000-480	45	42,0	18	18	35	20	480	-	4,30
	4.000-600	45	50,0	15	20	35	20	600	-	5,45

2. ACCESORIES FOR RIGID LINES

2.1 JOINT CLAMPS

Copper Steel rail



Code	Reference	Conductor rail reference	Dimensions		Weight (Kg)
			A	C	
204384	3.061-25	3.025	140	M10	0,387
204052	3.061-50	3.050	140	M10	0,387
204053	3.061-75	3.075	140	M10	0,387
204054	3.061-100	3.100	140	M10	0,387
204055	4.061-50	4.050	140	M12	0,940
204056	4.061-100	4.100	140	M12	0,960
204057	4.061-150	4.150	140	M12	0,960
204058	4.061-200	4.200	140	M12	0,980
204059	4.061-250	4.250	140	M12	0,980
204060	4.061-300	4.300	140	M12	0,995
204061	4.061-350	4.350	140	M12	0,995
204062	4.061-400	4.400	140	M12	1,100
204063	4.061-500	4.500	140	M12	1,200
204064	4.061-600	4.600	140	M12	1,300

Copper aluminium rail



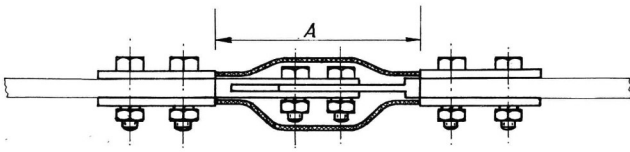
Code	Reference	Conductor rail reference	Dimensions		Weight (Kg)
			A	C	
204068	35.061-30	35.030	130	M10	0,285
204069	35.061-50	35.050	130	M10	0,305
204070	35.061-75	35.075	130	M10	0,330
204071	35.061-100	35.100	130	M10	0,335
204072	35.061-150	35.150	130	M10	0,350

Made of two copper flats with screws which trap the head and body of the rail, guaranteeing electrical and mechanical connections. The guides holding the base of the rail ensure it is properly aligned and prevent kinking.

All copper rail

Code	Reference	Conductor rail reference	Dimensions		Weight (Kg)
			A	C	
204065	3061-B-310	3.000-310	136	M10	0,700
204066	4061-B-480	4.000-480	140	M12	1,140
204067	4061-B-600	4.000-600	140	M12	1,360

2.2 EXPANSION JOINT



On assembly, ambient temperature should be taken into account. In maximum cold, the joint should be fully opened, and in maximum heat, fully closed.

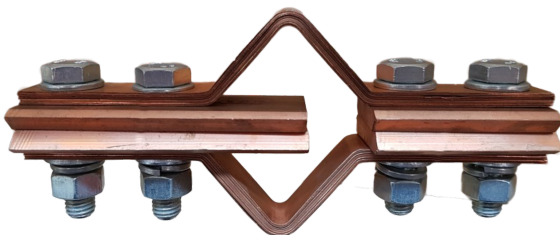
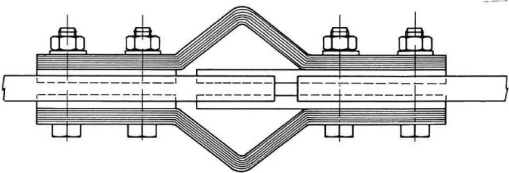
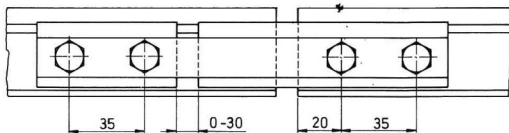
Insulated supports should be placed on either side of the joint (200-400mm) to prevent the rail from bending.

COPPER STEEL RAIL (Expansion of 30 mm should be permitted.)

Code	Reference	Reference rail	A	Screws	weight (Kg)
204374	3.071	3.025	130	M10	0,690
204076	3.072	3.050	130	M10	0,800
204077	3.073	3.075	130	M10	1,000
204078	3.074	3.100	130	M10	1,080
204393	4.070	4.050	140	M12	1,620
204079	4.071	4.100	140	M12	1,780
204080	4.072	4.150	140	M12	1,850
204081	4.073	4.200	140	M12	2,200
204082	4.074	4.250	140	M12	2,300
204083	4.075	4.300	140	M12	2,410
204084	4.076	4.350	140	M12	2,520
204085	4.077	4.400	140	M12	2,600
204086	4.078	4.500	140	M12	2,750
204087	4.079	4.600	140	M12	2,900

E JOINT TYPE

Add E to reference in table.



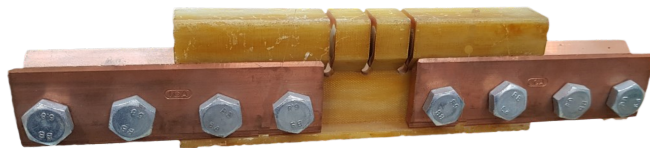
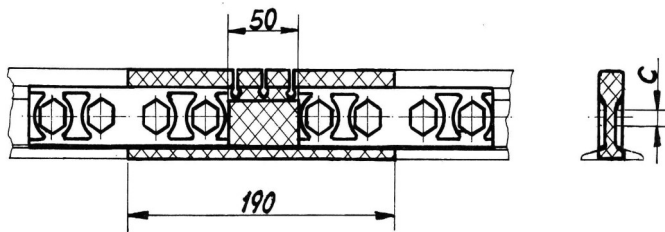
COPPER ALUMINIUM RAIL (Expansion of 40mm should be permitted.)

Code	Reference	Reference rail	A	Screws	weight (Kg)
204091	35.071	35.030	136	M10	0,620
204092	35.072	35.050	136	M10	0,665
204093	35.073	35.075	136	M10	0,805
204094	35.074	35.100	136	M10	1,100
204095	35.075	35.150	146	M10	1,240

ALL COPPER RAIL (Expansion of 30mm should be permitted)

Code	Reference	Reference rail	A	Screws	Weight (Kg)
204088	3.074-B	3.000-310	130	M10	1,350
204089	4.074-B	4.000-480	140	M12	1,400
204090	4.075-B	4.000-600	140	M12	1,520

2.3 ISOLATION SECTIONS



COPPER STEEL RAIL

Code	Reference	Reference rail	Screws	Weight (Kg)
204153	3.081-25	3.025	M10	0,685
204099	3.081-50	3.050	M10	0,696
204100	3.081-75	3.075	M10	0,707
204101	3.081-100	3.100	M10	0,717
204102	4.081-50	4.050	M12	1,234
204103	4.081-100	4.100	M12	1,252
204104	4.081-150	4.150	M12	1,274
204105	4.081-200	4.200	M12	1,290
204106	4.081-250	4.250	M12	1,300
204107	4.081-300	4.300	M12	1,312
204108	4.081-350	4.350	M12	1,326
204109	4.081-400	4.400	M12	1,373
204110	4.081-500	4.500	M12	1,420
204111	4.081-600	4.600	M12	1,500

Made of copper flanges to make easier the electrical connection and a central insulation piece.

Used to separate steel structure into power sections and/or create repair areas.

COPPER ALUMINIUM RAIL

Code	Reference	Reference Rail	Screws	Weight (Kg)
204115	35.081-30	35.030	M10	0,470
204116	35.081-50	35.050	M10	0,500
204117	35.081-75	35.075	M10	0,540
204118	35.081-100	35.100	M10	0,590
204119	35.081-150	35.150	M10	0,680

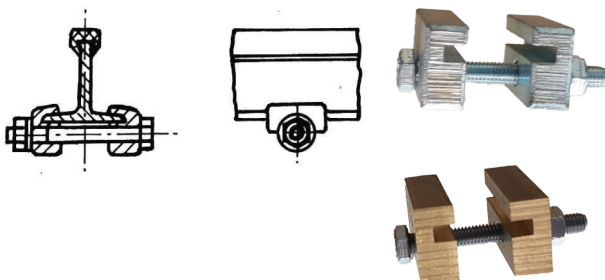
ALL COPPER RAIL

Code	Reference	Reference rail	Screws	Weight (Kg)
204112	3.081-310-B	3.000-310	M10	0,720
204113	4.081-480-B	4.000-480	M12	1,272
204114	4.081-600-B	4.000-600	M12	1,410

2.4 ANTI-CREEP CLAMPS

Fixed strongly on the base of the rail on both sides of the insulated support. This point is set as a fixed point from where the dilations are oriented.

On request can be manufactured of stainless steel or brass.

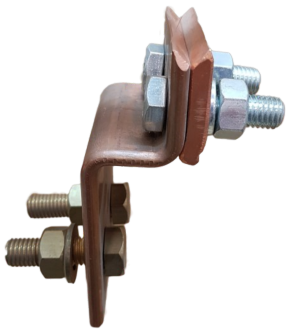
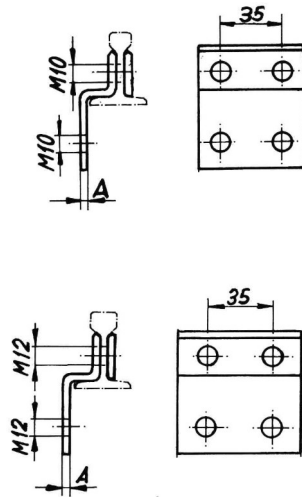


Code	Reference	wide base lane	Length mm	Screws	Weight (Kg)
204046	3.014	30	35	M8	1,115
204048	35.014	35	35	M8	1,137
204047	4.014	45	35	M8	1,151

2.5 LINE FEEDS

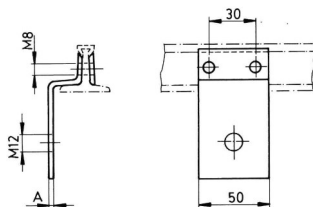
Made up of a service plate and counter plate to increase the contact area.

COPPER STEEL RAIL



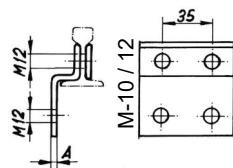
Code	Reference	Reference rail	A	Screws	Weight (Kg)
204416	3.091-25	3.025	3	M10	0,350
204123	3.091-50	3.050	3	M10	0,350
204124	3.091-75	3.075	3	M10	0,350
204125	3.091-100	3.100	3	M10	0,350
204411	4.091-50	4.050	4	M12	0,600
204126	4.091-100	4.100	4	M12	0,600
204127	4.091-150	4.150	4	M12	0,600
204128	4.091-200	4.200	4	M12	0,600
204129	4.091-250	4.250	5	M12	0,680
204130	4.091-300	4.300	5	M12	0,680
204131	4.091-350	4.350	5	M12	0,820
204132	4.091-400	4.400	6	M12	0,900
204133	4.091-500	4.500	7	M12	0,980
204134	4.091-600	4.600	8	M12	1,060

COPPER ALUMINIUM RAIL



Code	Reference	Referene Rail	A	Screws	Weight (Kg)
204130	35.091-30	35.030	4	M8	0,400
204123	35.091-50	35.050	5	M8	0,480
204140	35.091-75	35.075	5	M8	0,480
204141	35.091-100	35.100	6	M8	0,560
204142	35.091-150	35.150	6	M8	0,560

ALL COPPER RAIL



Code	Reference	Reference rail	A	Screws	Weight (Kg)
204112	3.081-310-B	3.000-310	5	M10	0,750
204113	4.081-480-B	4.000-480	7	M12	0,980
204114	4.081-600-B	4.000-600	8	M12	1,060

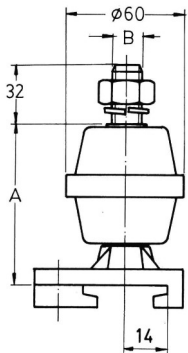
2.6 INSULATED RAIL SUPPORT

Composed of a brass support and insulator.

In th erference, the first code refers to the support and the second to the insulator.

The rail should run smoothly on these supports (with loosenes) to make the expansion joints operational.

These assembles are most used on steep copper and copper rails on request the support can be made of stainless steel.



Ref. 3.009-253

Code	Reference	Reference rail	Dimensions		Weight (Kg)
			A	B	
204029	3.009-250	3.025 al 3.100	77	M12	0,463
204030	3.009-253	3.025 al 3.100	83	M12	0,550
204028	4.009-213	4.050 al 4.600	75	M16	0,750
204408	4.009-219	4.050 al 4.600	100	M16	0,900

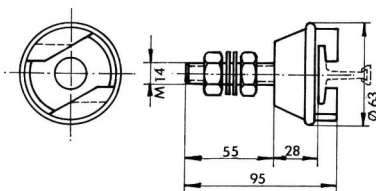
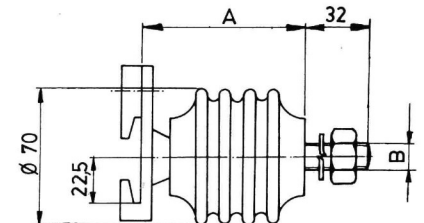
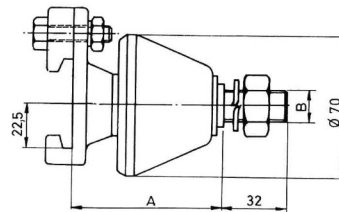
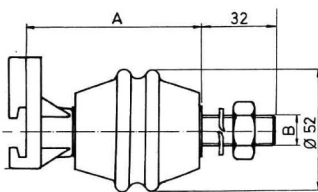
Ref. 3.009-250



Ref. 4.009-213



Ref. 4.009-219



Ref. 35.010-214



Support made of insulating plastic material with threaded shaft.

For copper head rail and aluminum base.

It can be used for all references between 35,030 to 35,150

Code	Reference	Reference rail	Weight
			(Kg)
204044	35.010-14	35.030 al 35.150	0,180

CURRENT COLLECTORS

1. CONTACT BRUSHES AND PULLEY

Contact brushes made of graphite:

- Graphite (G): for rubbing on a copper conductor rail.
- Bronze (Z) or Cast Iron (F): for rubbing on steel conductor rail.

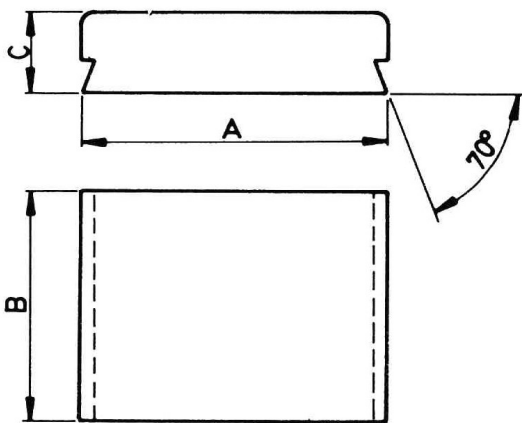
Different qualities of graphite.

Grade:

- D - Hard graphite: use in normal conditions.
- GC - Graphite alloyed with copper: use in normal working conditions where greater density of current is needed.
- GCC - Graphite with copper predominating in the alloy: use for heavy density current. Low speed. Recommended in automatic welding.

GRAPHITE CONTACT BRUSHES

CODE	Reference	A	B	C	Capacity (Amp)	Weight (Kg)
205083	GR-1-D	150	100	30	200	0,700
205088	GR-1-GC	150	100	30	600	1,108
205093	GR-1-GCC	150	100	30	1200	2,321
205084	GR-2-D	80	70	30	150	0,250
205089	GR-2-GC	80	70	30	400	0,410
205094	GR-2-GCC	80	70	30	1000	0,850
205085	GR-3-D	80	100	30	180	0,366
205090	GR-3-GC	80	100	30	400	0,542
205095	GR-3-GCC	80	100	30	1000	1,129
205086	GR-4-D	80	140	30	200	0,520
205091	GR-4-GC	80	140	30	450	0,830
205096	GR-4-GCC	80	140	30	1000	1,740
205087	GR-5-D	140	140	30	200	1,014
205092	GR-5-GC	140	140	30	600	1,440
205097	GR-5-GCC	140	140	30	1300	3,020
—	GR-6-D	140	100	30	200	0,650
2051-42	GR-6-GC	140	100	30	550	1,122
—	GR-6-GCC	140	100	30	1200	2,150

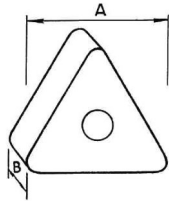


CAST IRON CONTACT BRUSHES

Code	Reference	A	B	C	Capacity (Amp)	Weight (Kg)
205120	FR-1	150	100	30	200	3,126
205121	FR-3	80	100	30	150	1,676

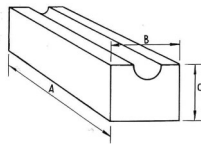
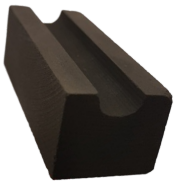
BRONZE CONTACT BRUSHES

CODE	Referen- cie	A	B	C	Capacity (Amp)	Weight (Kg)
205118	ZR-1	150	100	30	300	3,332
205119	ZR-3	80	100	30	200	1,787



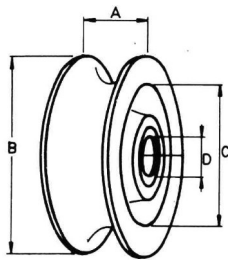
TRIANGULAR GRAPHITE

Code	Reference	A	B	Diameter	Capacity (Amp)	Weight (Kg)
205098	GT-1	42	40	14,25	50	0,062
205099	GT-2	57	38	16,50	75	0,145
205100	GT-3	57	75	16,50	100	0,280
205101	GT-4	57	30	16,50	75	0,111
205102	GT-5	75	24	20,00	100	0,133
205103	GT-6	75	33	20,00	100	0,145
205104	GT-7	57	65	16,50	100	0,319
205105	GT-8	57	85	16,50	150	0,312
205106	GT-9	80	100	20,00	150	0,583
205107	GT-10	80	150	20,00	150	0,530



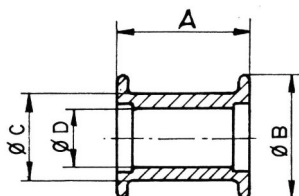
RECTANGULAR GRAPHITE

Code	Reference	A	B	C	Capacity (Amp)	Weight (Kg)
205108	GL-1	43	26,7	28	75	0,048
205109	GL-2	64	24	20	100	0,043
205110	GL-3	100	24	20	150	0,069



TOUGHENED PULLEYS WITH SELF LUBRICATION BUSH

Code	Reference	A	B	C	D	Capacity (Amp)	Weight (Kg)
205111	P-1	25	55	35	12	50	0,191
205112	P-2	25	70	50	13	75	0,374
205113	P-3	30	84	58	16	100	0,613

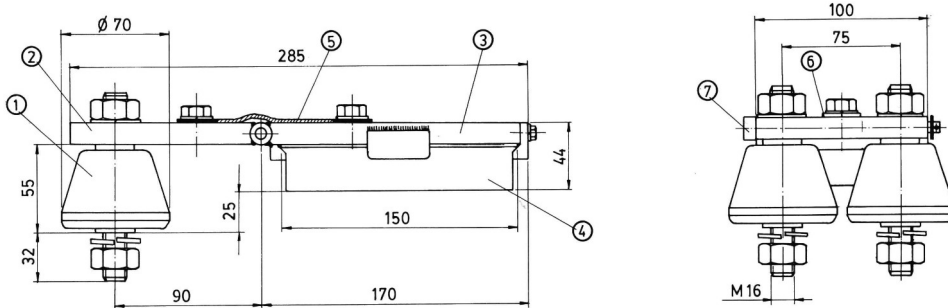


SPECIAL PULLEYS

Code	Reference	A	B	C	D	Capacity (Amp)	Weight (Kg)
205114	P-4	52	49	34	9	50	0,374
205115	P-5	68	60	45	20	75	0,649

2. GRAVITY CURRENT COLLECTOR

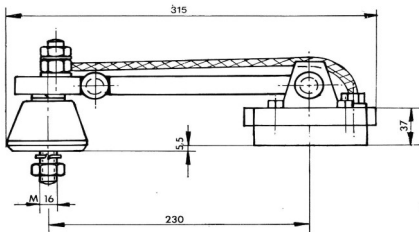
Ref. 2.113-273



NOMENCLATURE:

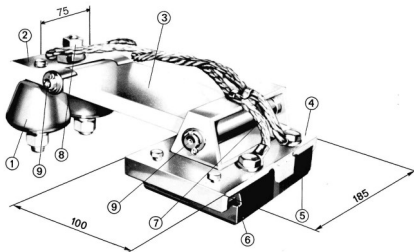
1. Insulator 213
2. Anchor plate
3. Swivel plate
4. Contact brush
5. Plaited cable
6. Terminal
7. Swivel shaft

Ref. 2.137 y 2.138



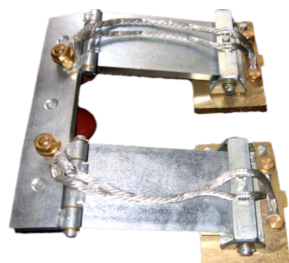
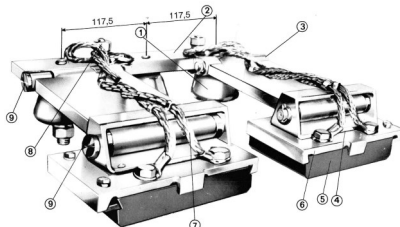
NOMENCLATURE:

1. Insulator 213
2. Anchor plate
3. Swivel plate
4. Contact brush carrier
5. Contact brush
6. Contact brush fixed plate
7. Plaited cable
8. Terminal
9. Swivel shaft



Ref. 2.137

Ref. 2.138

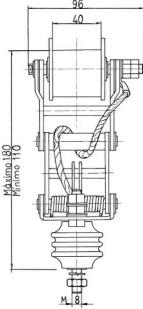


Code	Reference	Brush Material	Brush Refence	Capacity (Amp)	Weight (Kg)
206001	2.113-273-F	Iron	F-2113-273	200	7,408
206003	2.113-273-Z	Bronze	Z-2113-273	300	7,614
206002	2.113-273-G	Graphite	G-2113-273	200	4,932
206005	2.137-F	Iron	FR-1	200	8,924
206007	2.137-Z	Bronze	ZR-1	300	9,138
206006	2.137-G	Graphite	GR-1-D	200	6,498
206008	2.138-2F	Iron	2xFR-1	400	17,848
260010	2.138-2Z	Bronze	2xZR-1	600	18,276
206009	2.138-2G	Graphite	2xGR-1-D	400	12,996

3. UNIVERSALS CURRENT COLLECTORS

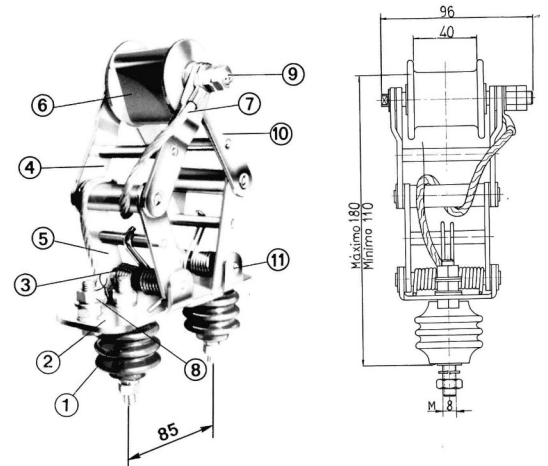
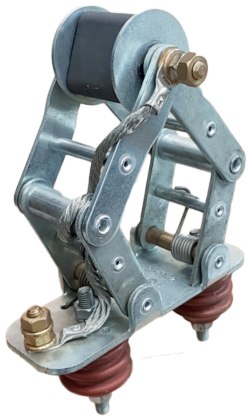
Pantograph type. They exert constant pressure on the rails, brushed in articulations.

Ref. 2.139



NOMENCLATURE:

1. Insulator 240
2. Base
3. Spring
4. Upper arm
5. Lower arm
6. Pulley P-4 or contact brush GT-1
7. Plaited cable
8. Terminal
9. Pulley shaft
10. Straight upper arm
11. Spring shaft

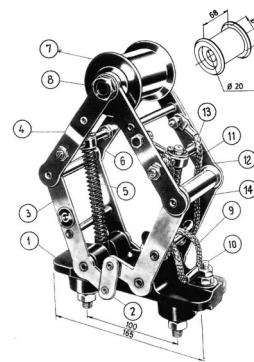
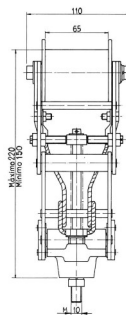
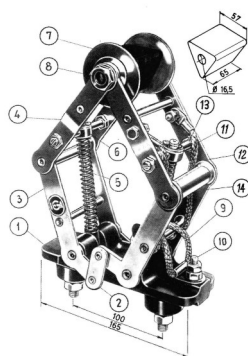


Code	Reference	Contact brush	Contact brush reference	Capacity (Amp)	Weight (Kg)
207001	2.139-B-G	Graphite	Brush GT-1	50	1,098
207002	2.139-B-P	Bronze	Pulley P-4	50	1,370

Ref. 2.147

NOMENCLATURE:

1. Insulating base
2. Con-rod
3. Lower left arm
4. Upper left arm
5. Spring
6. Spring swivel
7. Pulley P-5 or contact brush GT-7
8. Swivel shaft
9. Plaited cable
10. Terminal
11. Threaded shaft
12. Upper right arm
13. Spring shaft
14. Lower right arm





CONTACT POWER LINES

Ref. 2.148-B y 2.148-B-2

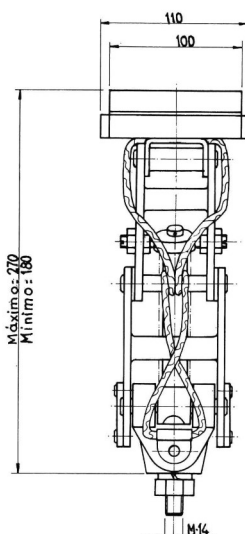
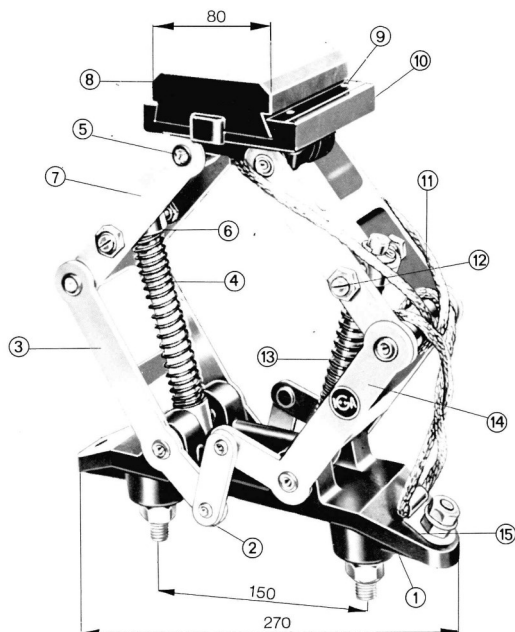
Pantograph - with one contact brush: 2148-B
 - with double contact brush: 2148-B-2

The contact brush can be made of:

- Cast iron F
- Hardened bronze Z
- Graphite G. The letter "C" indicates the percentage of copper in the graphite.

All parts are replaceable.

Ref. 2.148-B



NOMENCLATURA:

1. Insulating base
2. Con-rod
3. Lower left arm
4. Spring
5. Swivel shaft
6. Spring swivel
7. Upper arm
8. Contact brush
9. Contact brush fixing plate
10. Contact brush carrier
11. Plaited cable
12. Threaded shaft
13. Spring shaft
14. Lower right arm
15. Terminal
16. Contact brush con-rod

Ref. 2.148-B-2



Code	Reference	contact brush Material	contact brush Reference	Capacity (Amp)	weight (Kg)
207005	2.148B-F	Iron	FR-3	150	5,800
207006	2.148B-Z	Bronze	ZR-3	200	5,911
207007	2.148B-G	Graphite	GR-3-D	180	4,452
207008	2.148B-GC	Graphite	GR-3-GC	400	4,800
207009	2.148B-GCC	Graphite	GR-3-GCC	1000	5,253
207010	2.148B-2-F	Iron	2xFR-3	300	8,523
207011	2.148B-2-Z	Bronze	2xZR-3	400	8,634
207012	2.148B-2-G	Graphite	2xGR-3-D	360	5,861
207013	2.148B-2-GC	Graphite	2xGR-3-GC	800	6,470
207014	2.148B-2-GCC	Graphite	2xGR-3-GCC	2000	7,800



CONTACT POWER LINES

Ref. 2.128-B y 2.128-B-2

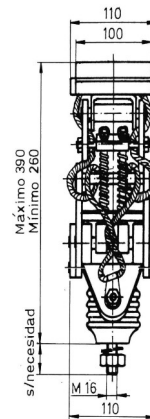
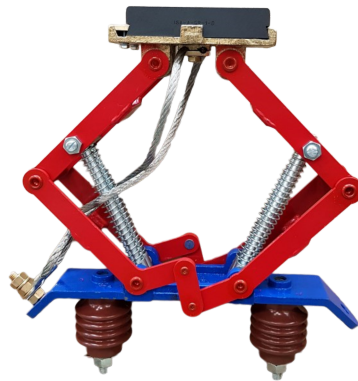
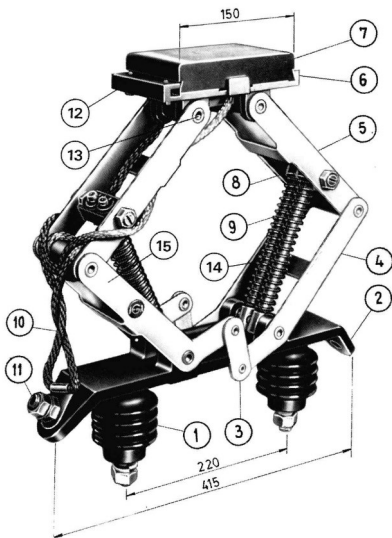
- Pantographs - With one contact brush: 2128-B
 - With double contact brush: 2128-B-2

The contact brush can be made of:

- Cast iron F
- Hardened bronze Z
- Graphite G. The letter "C" indicates the percentage of copper in the graphite.

All parts are replaceable.

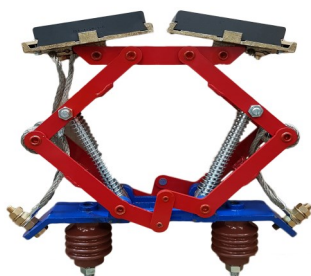
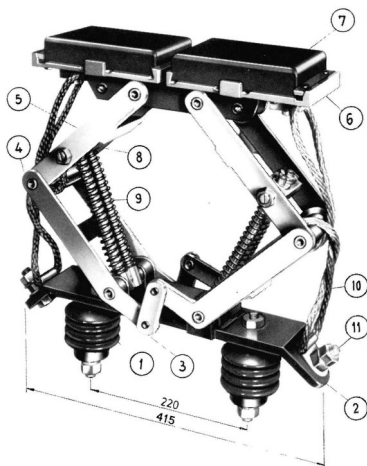
Ref. 2.128-B



NOMENCLATURE:

1. Insulator
2. Base
3. Con-rod
4. Lower right arm
5. Upper arm
6. Contact brush carrier
7. Contact brush
8. Spring swivel
9. Spring
10. Plaited cable
11. Connection terminal
12. Contact brush fixing plate
13. Swivel shaft
14. Spring guide
15. Lower left arm.

Ref. 2.128-B-2



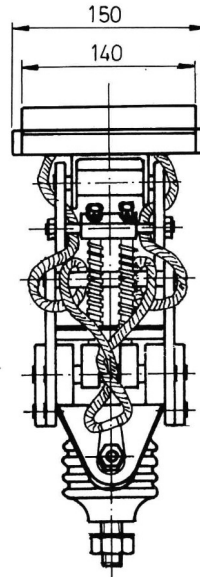
Code	Reference	Contact brush material	Contact brush reference	Capacity Amp	Weight (kg)
207015	2.128B-F	Iron	FR-1	200	14,144
207016	2.128B-Z	Bronze	ZR-1	300	14,350
207017	2.128B-G	Graphite	GR-1-D	200	11,718
207018	2.128B-GC	Graphite	GR-1-GC	600	12,126
207019	2.128B-GCC	Graphite	GR-1-GCC	1200	13,339
207020	2.128B-2-F	Iron	2xFR-1	400	19,680
207021	2.128B-2-Z	Bronze	2xZR-1	600	20,092
207022	2.128B-2-G	Graphite	2xGR-1-D	400	14,828
207023	2.128B-2-GC	Graphite	2xGR-1-GC	1200	15,644
207024	2.128B-2-GCC	Graphite	2xGR-1-GCC	2400	18,100



CONTACT POWER LINES

Ref. 2.163-G

Same as current collector 2.128
But with graphite contact brush GR-5-D

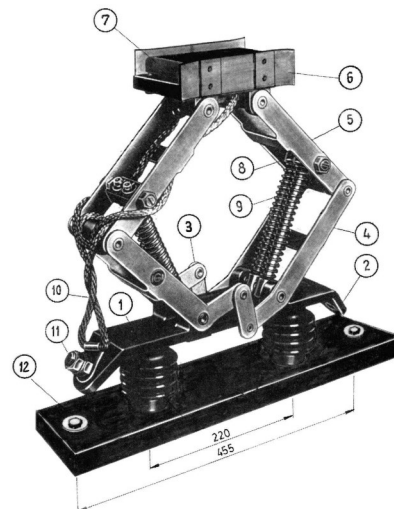
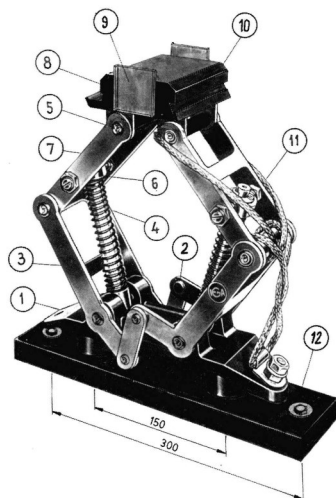


OPTIONS

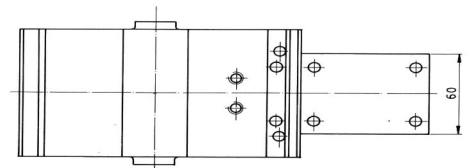
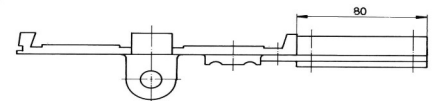
Universal current collectors can be fitted with elastic supports on the base and guide fins on the bushcarriers to work better in installations that have a lot of lateral deviation between the crane rail and the electric rails.

Ref. 2.148-B-G-SE-A

Ref. 2.128-B-G-SE-A



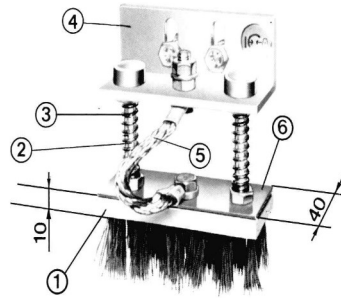
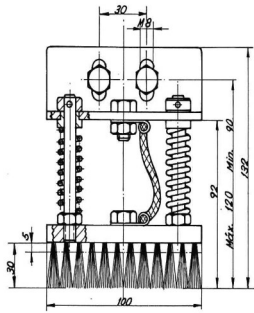
In installations that work with dusty environments (cement, incinerators, etc.) it is advisable to assemble cleaning brushes in at least one of the directions of the crane, to remove the dust that prevent good contact between the contact brush and the conductor rail.



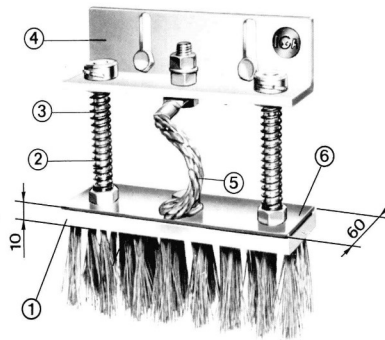
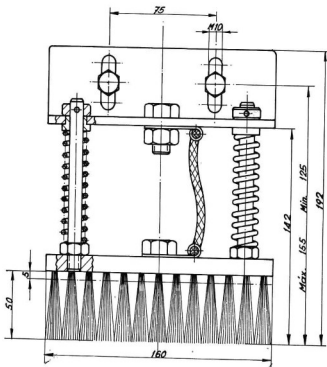
4. GROUND COLLECTOR BRUSHES

Sliding on conductor rail.
Fit two brushes per machine.
The conductor rails must be joint electrically.

Ref. 2.150



Ref. 2.151



NOMENCLATURE:

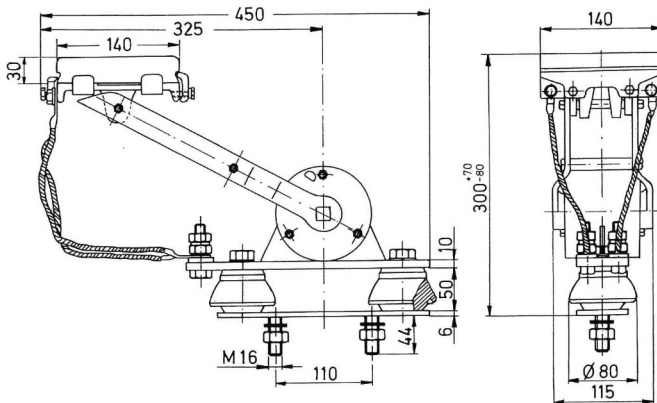
1. Contact brush
2. Spring
3. Spring shaft
4. Fixing plate support
5. Plaited cable
6. Closing plate

Code	Reference	Brush wire	Capacity Amp	Weight (kg)
208001	2.150	Stainless Steel	100	0,620
208002	2.151	Stainless Steel	200	1,450

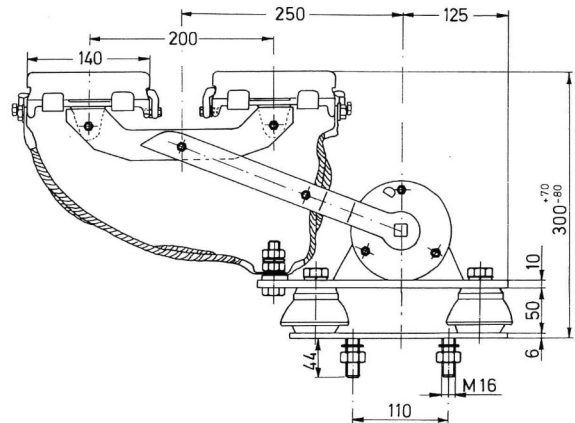
5. SEALED CURRENT COLLECTOR

With one articulation. For working in dusty, aggressive environments.
Applied in line vertically and horizontally.

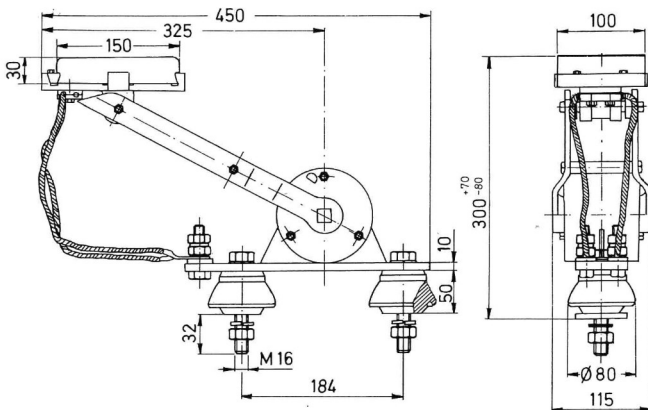
Ref. 2.160-GC-5



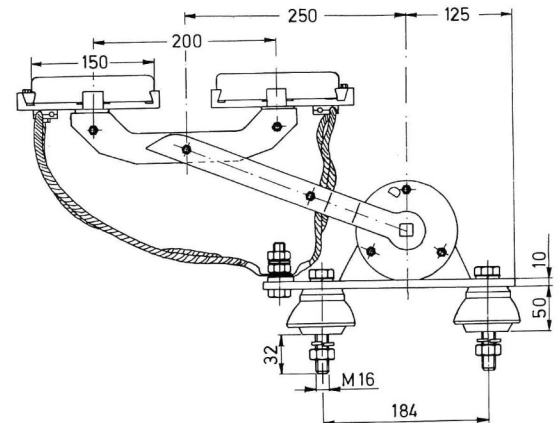
Ref. 2.160-2GC-5



Ref. 2.160-GC-1



Ref. 2.160-2GC-1

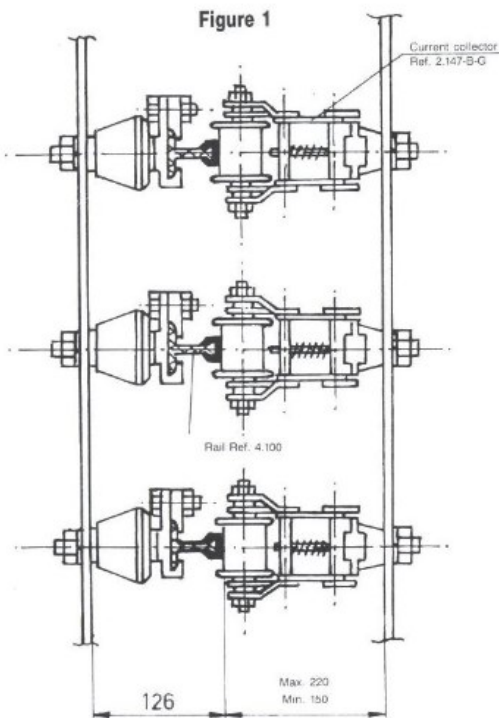


Code	Reference	Contact brush material	Contact brush reference	Capacity Amp	Weight (kg)
209003	2.160-GC-5	Graphite	GR-5-GC	600	11,217
209004	2.160-2GC-5	Graphite	2xGR-5-GC	1200	12,657
209001	2.160-GC-1	Graphite	GR-1-GC	600	10,435
209002	2.160-2GC-1	Graphite	2xGR-1-GC	1200	11,543
209005	2.160-GR-1	Graphite	GR-1-D	200	10,477
209006	2.160-2GR-1	Graphite	2xGR-1-D	400	11,177

ASSEMBLY INSTRUCTIONS

1. TYPES OF INSTALLATION

Considering the contact position of the current collector with the conductor rails, the installations are classified as horizontal or vertical.



VERTICAL INSTALLATIONS - Fig. 1

Rails are fitted one on top of the other, with the surface in contact of the rail head in a vertical position. The current collectors work in a horizontal position.

This is recommended as it eliminates dust from the rail head and contact brush. Differences in parallelism due to the structure of the civil work and the current collector line are absorbed by the elasticity of the current collector.

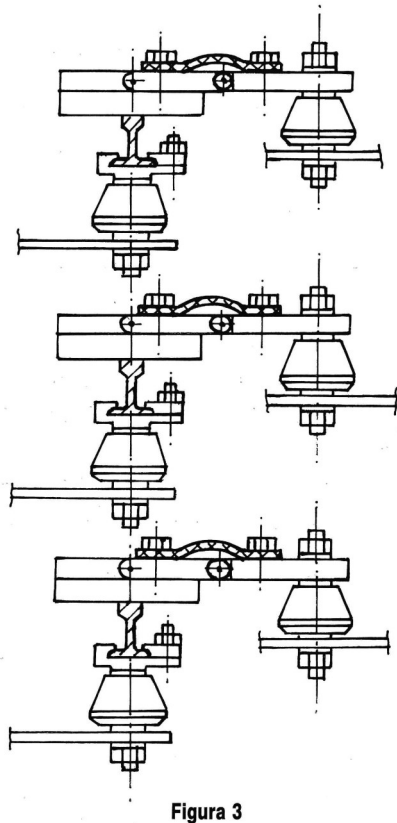


Figura 3

HORIZONTAL INSTALLATIONS - Fig. 2 y 3

The rails can be horizontal, Fig 2, or one on top of the other, fig. 3. In both cases the rail head contact surface is horizontal. The collectors work in a vertical position.

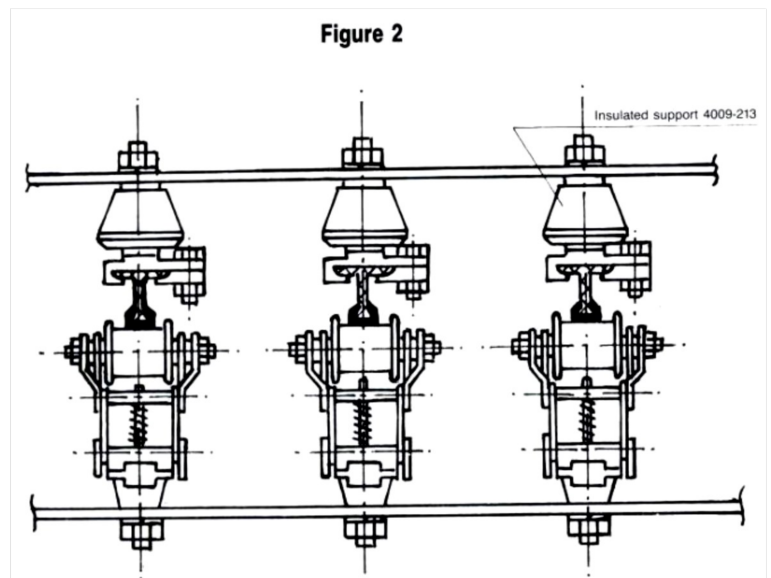


Figure 2

2. SELECTION OF ASSEMBLY POSITION

To choose the correct assembly position, consider the following:

1. Check the possibility of fitting the steel frame (as per fig. 4,7) for carrying insulated supports.
2. Avoid dust setting on the graphite and on the copper section.
3. Take into account looseness in the crane's wheels and deformation in civil work.
4. Ease of access to the line for assembling and maintenance.
5. Personnel safety: Avoid touching the line..

These recommendations are met if the line is assembled vertically over a rail beam and using our pantographs especially prepared for fitting horizontally.

For horizontal assembly, centre the collectors support on the crane.

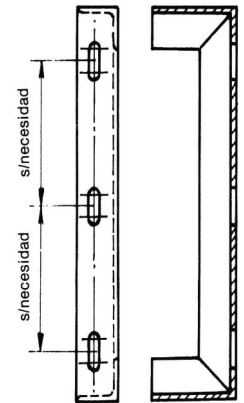


Figura 4

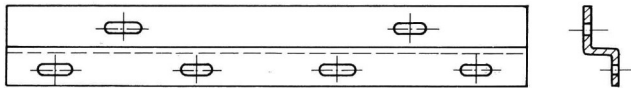
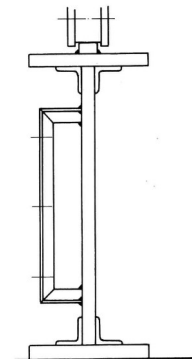


Figura 7



3. LINE PROJECT

Once the calculations are done and the assembly position is selected, a drawing of the installation is made up, showing supports, expansion joints, anti-creep clamps, joint clamps, etc.

4. INSULATED RAIL SUPPORTS

Depending on the dimensions of the rail, the supports indicated in figure 4 and 7 can be used.

Angle size	Rail type	base	Insulators
40x40 mm	3.000	30 mm	253-213
50x50 mm	4.000	45 mm	213-219

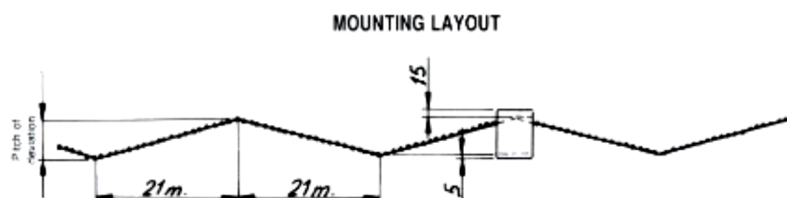
5. ASSEMBLY LAYOUT

Assembly should be zig-zagged to take full advantage of the contact brush surface and avoid channels forming due to right-angled wear (see assembly layout).

Pitch length 42 m is a guideline. Pitch is indicated by how often the crane Works in a certain área.

The figure for deviation from the line is obtained via the following formula: Deviation pitch = width of graphite minus (15+5+rail width)

Assembling and subsequent repairs are facilitated by using the crane on a cab or platform.



6. INSULATED SUPPORTS

Made up of jaws and insulator. Both references should be indicated (e.g 4009-213 is support 4009 plus insulator 213). Assemble so that the rail can run smoothly on the jaw by leaving 1-2mm. Play with the moving plate.

The jaw must be correctly aligned vertically and horizontally on the rail base to prevent resistance in movements produced by expansion. Movements improve if the jaw base is smeared with vaseline.

These notes on play and alignment are MOST IMPORTANT.

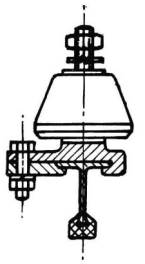


Figura 5

7. JOINT CLAMPS

Made up of a copper flat and guide in the rail base.

First fit the copper flats, making sure electrical contact is good. Then assemble the guides to align the line and make it rigid. If any difference of level is seen between rail heads after tightening the flanges, file the rail-heads until the collector moves smoothly.

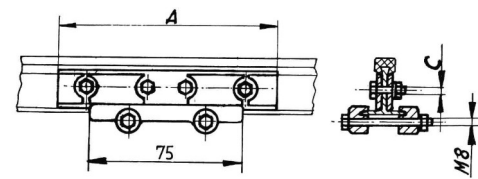


Figura 6

8. ISOLATING SECTIONS

These enable one or more sections of the line to be isolated at will. They are used to separate power feeds in one steel structure and so that one end can be used as a repair zone.

With two power feeds (Fig.8) and one switch a bridge is obtained.

Fit an insulated support on both sides of the isolating section (200-400mm) to avoid bending due to the pressure of the current collector (Fig. 5)

The use of isolating sections normally pre-supposes that double power feeds are mounted.

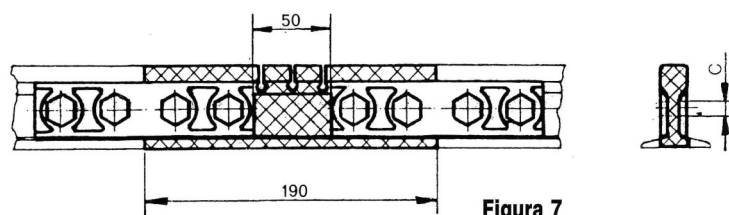


Figura 7

9. POWER FEEDS

Made of a copper flat whose thickness varies according to the amperage to be fed in.

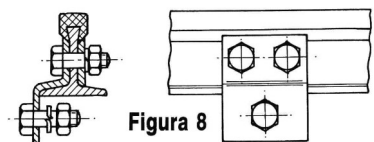


Figura 8

10. ANTI-CREEP CLAMPS

Fitted on both sides of the insulated support. They are considered as fixed points, from which expansion is directed towards the expansion joints or the free end of the line.

Start from these fixed points when mounting and finally adjusting a line.

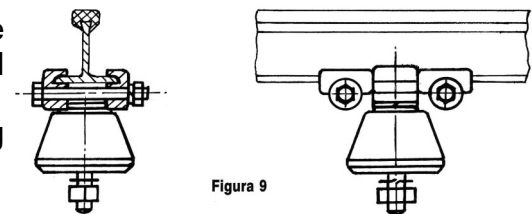


Figura 9

11. EXPANSION JOINTS

In installations more than 70 m. long, expansion joints must be used. To prevent the pressure of the current collector from deforming the line, it is advisable to fit a set of insulated support (Fig. 5) on both sides of the joint (200-400mm).

Expansion joints permit expansion of up to 30 mm.

If lines are assembled on metal structures with expansion joints, then expansion joints must be opened, and at high temperatures, almost closed. Temperature will increase due to electrical consumption.

Bearing in mind that the linear expansion of copper per degree centigrade is 0,0000178 per mm., for a temperature variation of 40 °C, expansion joints must be fitted every 42 m.

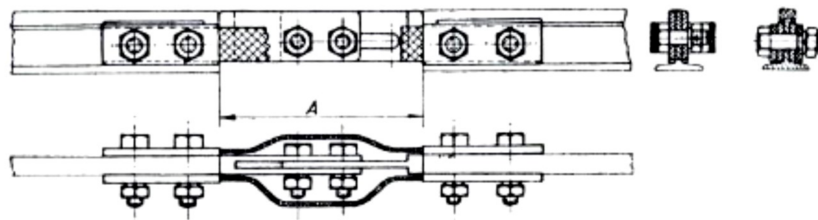


Figure 10

UP TO 70 M.



LONGER THAN 70 M.

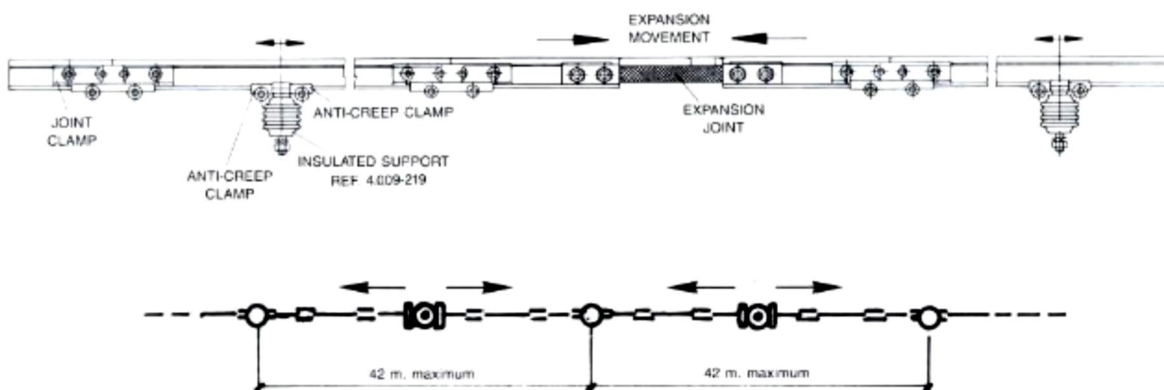


Figure 11



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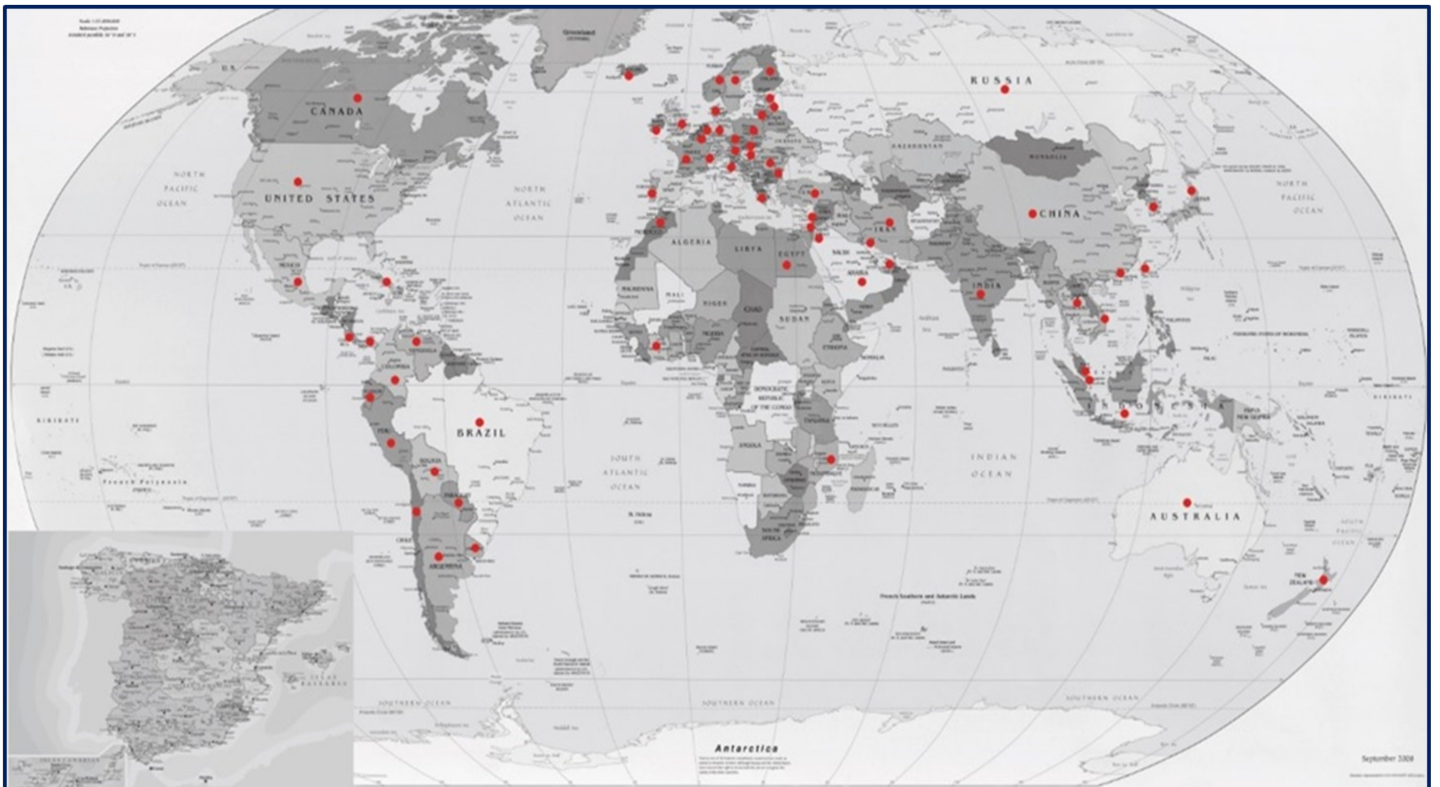
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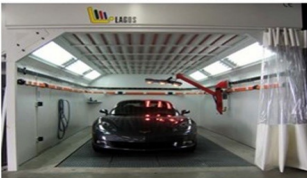
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