REVISION HISTORY	DATE
DRAWING CREATED	2010-01-15

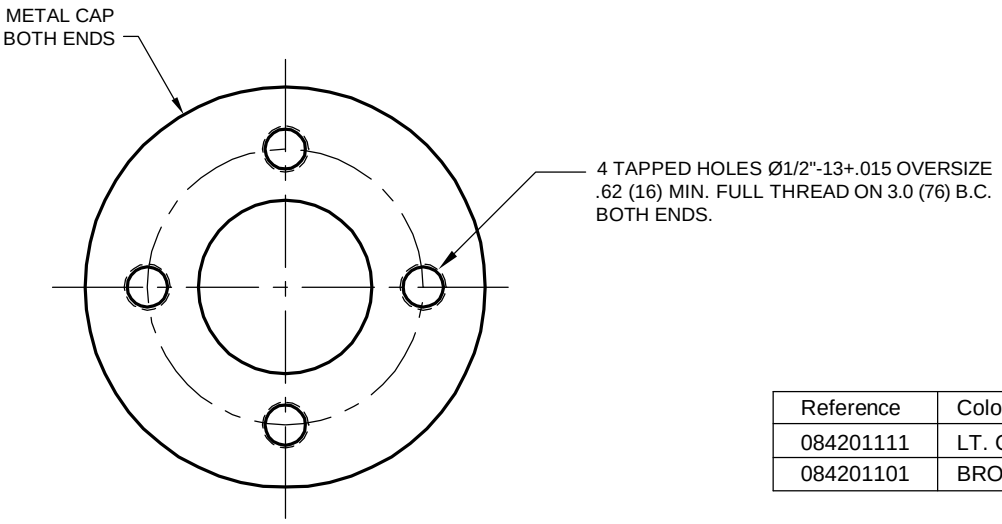
GAMMA corona

in. (mm)

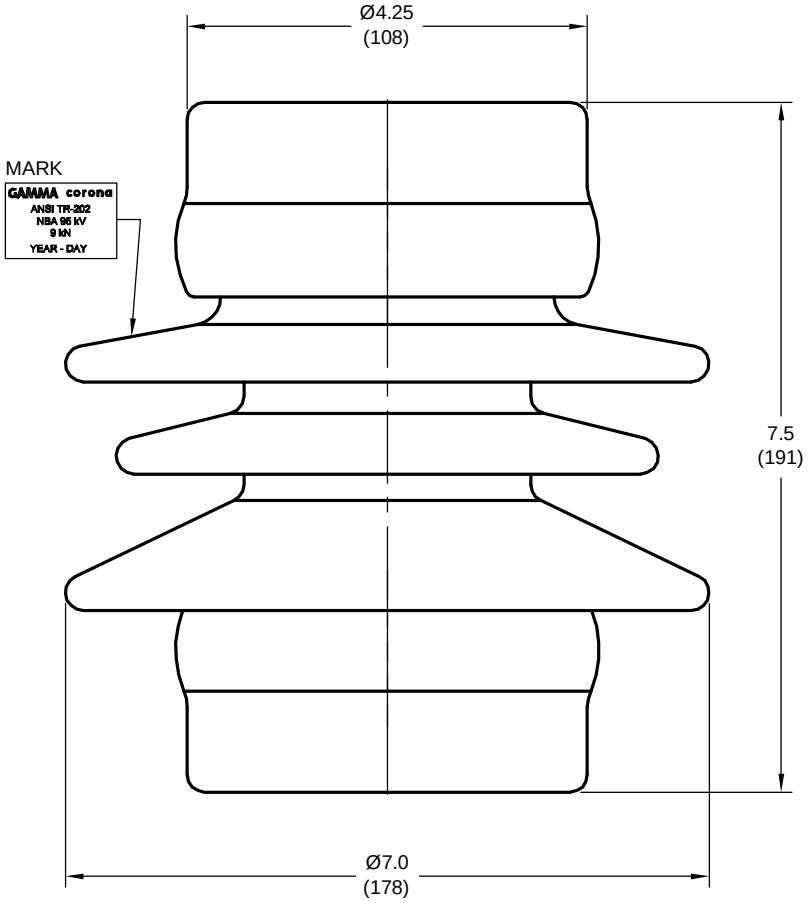
PART NUMBER 8420

TITLE POST TYPE INSULATOR TR-202

REF. TR-202



Reference	Color
084201111	LT. GRAY No. 70
084201101	BROWN



NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, inch (mm)	10.50	(267)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	2000	(9)
TENSILE STRENGTH, pounds (kN)	7000	(31.1)
TORSION STRENGTH, inch-pounds (kN-m)	6000	(0.67)
COMPRESSION STRENGTH, pounds (kN)	10000	(44.4)

ELECTRICAL VALUES

VOLTAGE CLASS, kV	7.5
CRITICAL IMPULSE FLASHOVER, POS., kV	105
LOW FREQUENCY WET WITHSTAND, kv	30
IMPULSE WITHSTAND, kV	95

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	5
MAXIMUM RIV AT 1000 kHz, MICROVOLTS	50

DWG. No. P:8420 /8420-CLIENTE	DWG. No.TYPE SALES		Autocad 2000	DWN. L.E. RINCÓN	APP. A.I.PÉREZ

REVISION HISTORY	DATE
DRAWING CREATED	2010-01-14

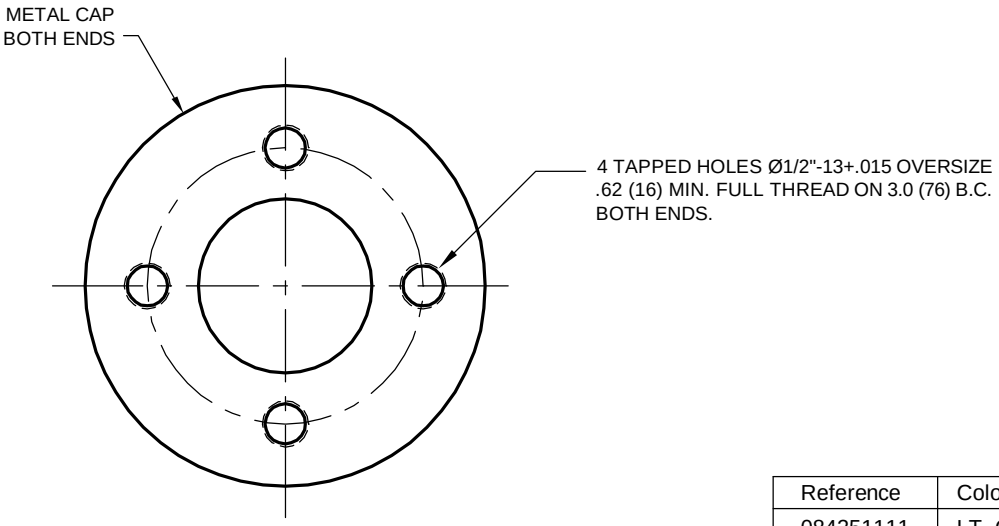
GAMMA corona

in. (mm)

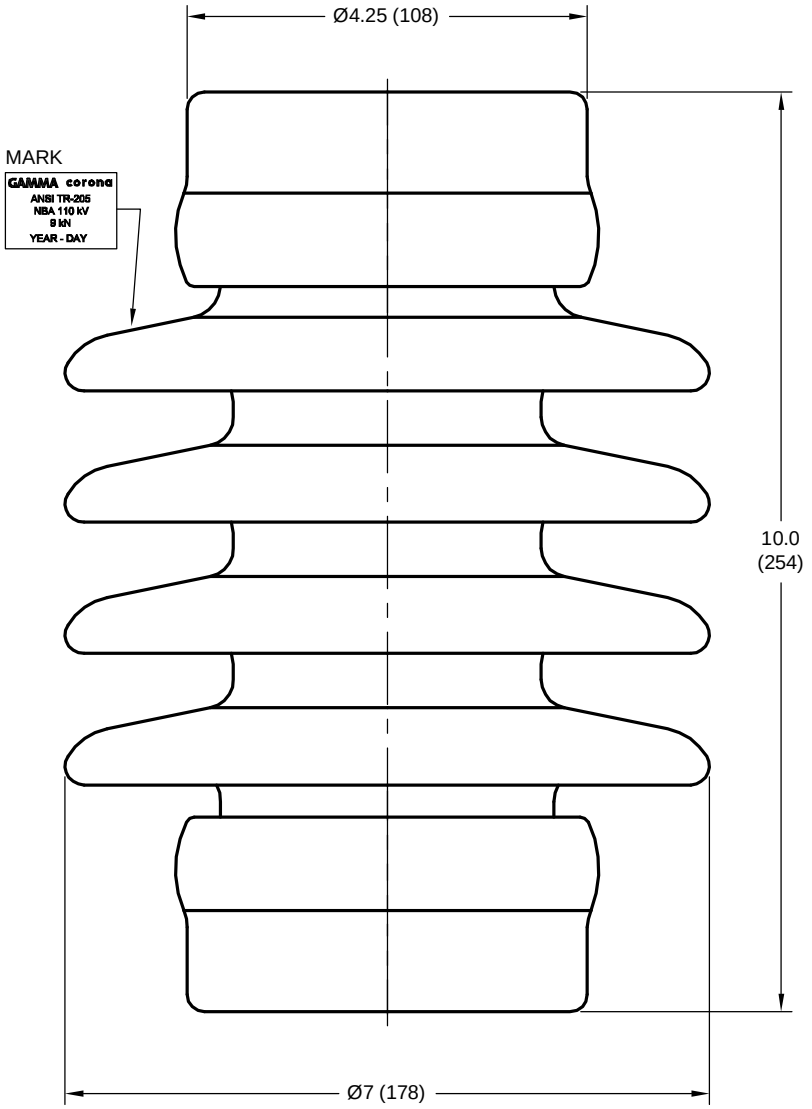
PART NUMBER 8425

TITLE POST TYPE INSULATOR TR-205

REF. TR-205



Reference	Color
084251111	LT. GRAY No. 70
084251101	BROWN



NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, inch (mm)	15.50	(394)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	2000	(9)
TENSILE STRENGTH, pounds (kN)	8500	(37.8)
TORSION STRENGTH, inch-pounds (kN-m)	7000	(0.79)
COMPRESSION STRENGTH, pounds (kN)	10000	(44.4)

ELECTRICAL VALUES

VOLTAGE CLASS, kV	15
CRITICAL IMPULSE FLASHOVER, POS., kV	125
LOW FREQUENCY WET WITHSTAND, kv	45
IMPULSE WITHSTAND, kV	110

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	10
MAXIMUM RIV AT 1000 kHz, MICROVOLTS	50

DWG. No. P:8425 /8425-CLIENTE	DWG. No.TYPE SALES		Autocad 2000	DWN. L.E. RINCÓN	APP. A.I.PÉREZ

REVISION HISTORY	DATE
DRAWING CREATED	2010-01-14

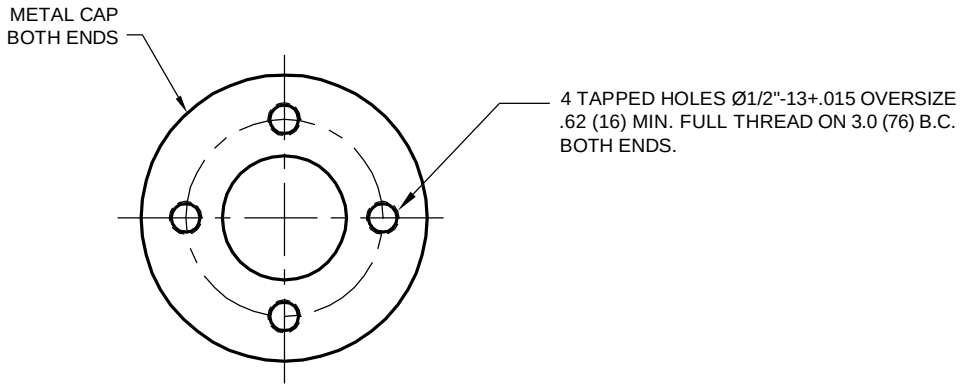
GAMMA corona

in. (mm)

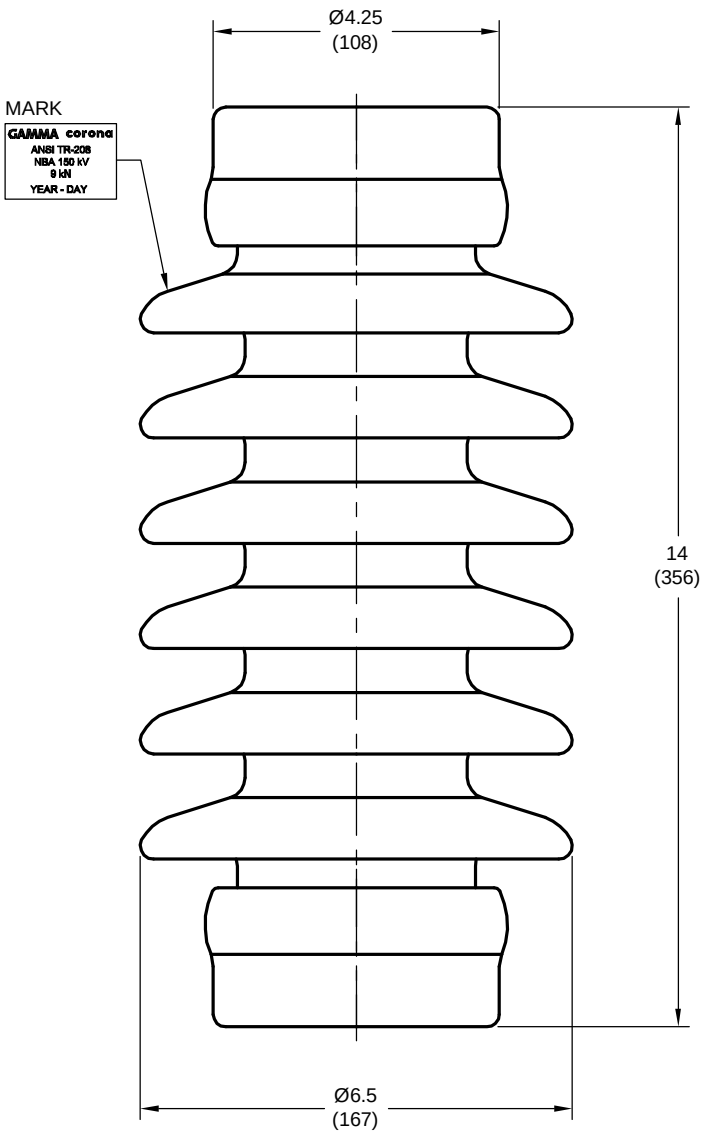
PART NUMBER 8428

TITLE POST TYPE INSULATOR TR-208

REF. TR-208



Reference	Color
084281111	LT. GRAY No. 70
084281101	BROWN



NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, inch (mm)	24	(610)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	2000	(9)
TENSILE STRENGTH, pounds (kN)	10000	(44.4)
TORSION STRENGTH, inch-pounds (kN-m)	8000	(0.90)
COMPRESSION STRENGTH, pounds (kN)	10000	(44.4)

ELECTRICAL VALUES

VOLTAGE CLASS, kV	23
CRITICAL IMPULSE FLASHOVER, POS., kV	170
LOW FREQUENCY WET WITHSTAND, kv	60
IMPULSE WITHSTAND, kV	150

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	15
MAXIMUM RIV AT 1000 kHz, MICROVOLTS	100

DWG. No. P:8428 /8428-CLIENTE	DWG. No.TYPE SALES		Autocad 2000	DWN. L.E. RINCÓN	APP. A.I.PÉREZ

REVISION HISTORY	DATE
DRAWING CREATED	2010-01-14

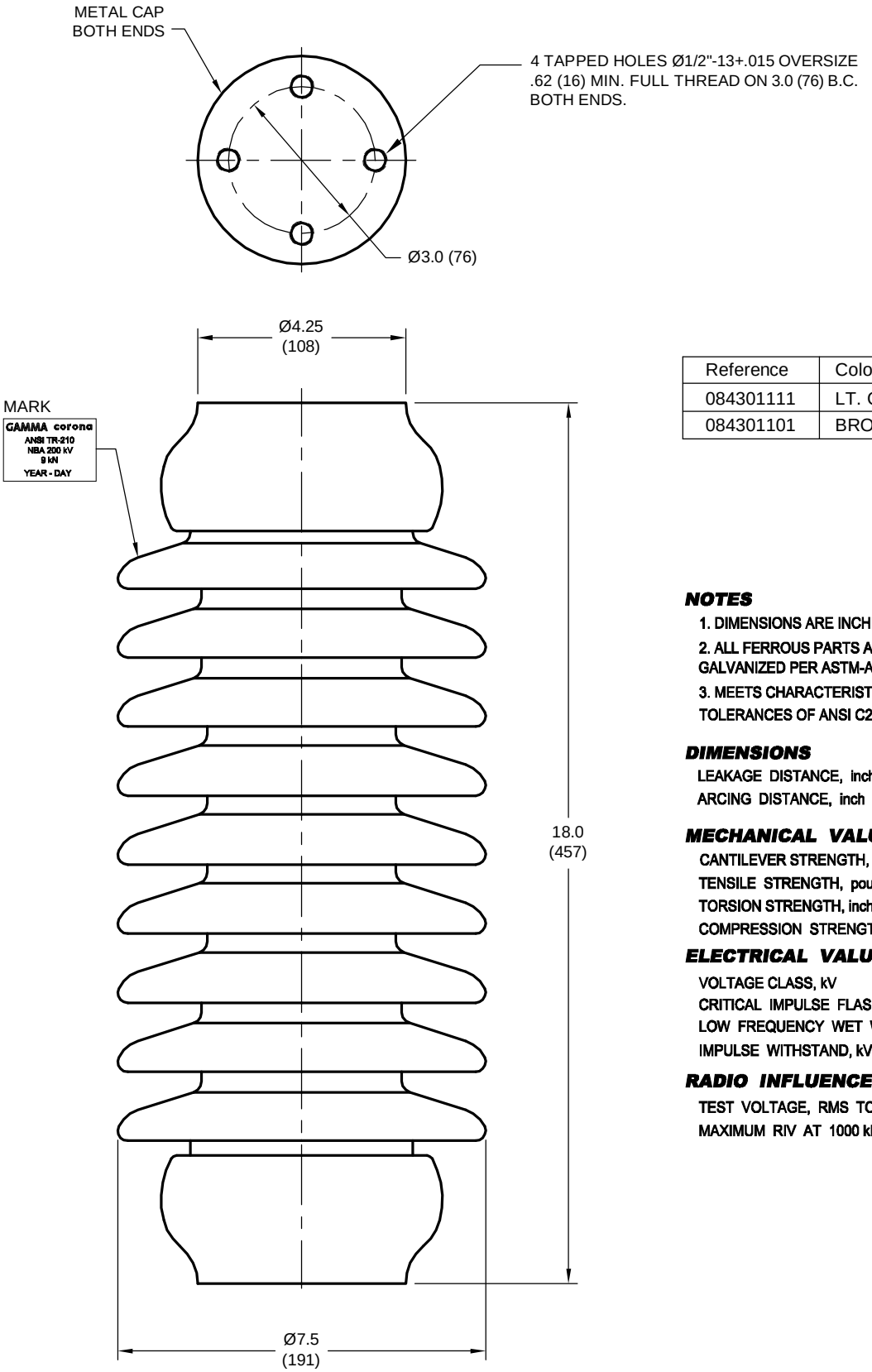
GAMMA corona

in. (mm)

PART NUMBER 8430

TITLE POST TYPE INSULATOR TR-210

REF. TR-210



Reference	Color
084301111	LT. GRAY No. 70
084301101	BROWN

NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, inch (mm)	37	(940)
ARCING DISTANCE, inch (mm)	13.77	(350)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	2000	(9)
TENSILE STRENGTH, pounds (kN)	12000	(53.4)
TORSION STRENGTH, inch-pounds (kN-m)	10000	(1.13)
COMPRESSION STRENGTH, pounds (kN)	15000	(66.7)

ELECTRICAL VALUES

VOLTAGE CLASS, kV	34.5
CRITICAL IMPULSE FLASHOVER, POS., kV	225
LOW FREQUENCY WET WITHSTAND, kv	80
IMPULSE WITHSTAND, kV	200

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	22
MAXIMUM RIV AT 1000 kHz, MICROVOLTS	100

REVISION HISTORY	DATE
DRAWING CREATED	2010-01-14

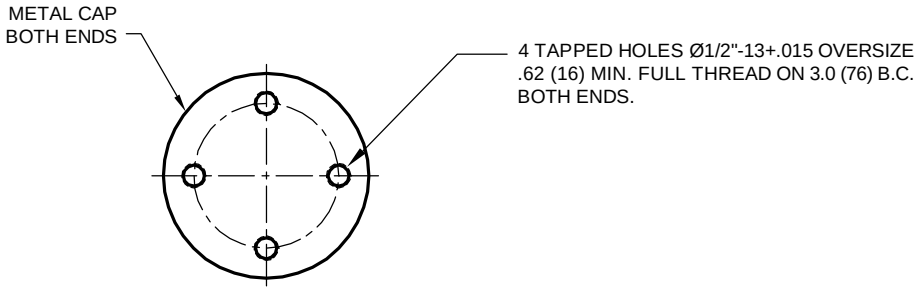
GAMMA corona

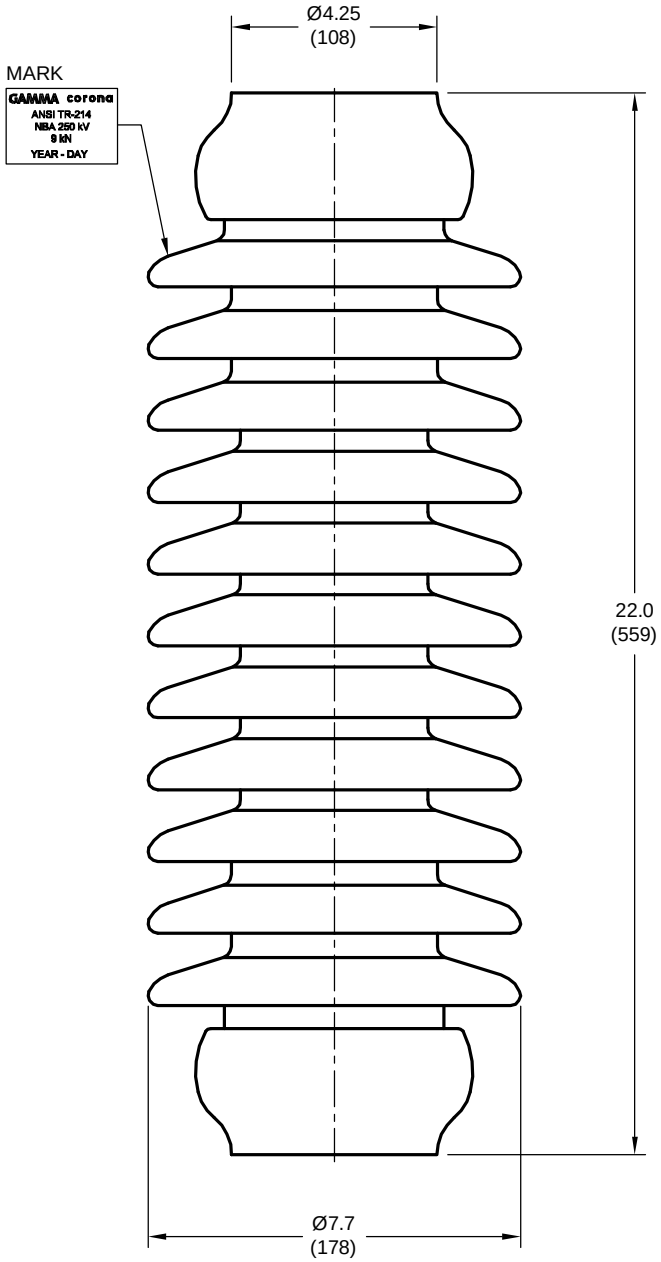
in. (mm)

PART NUMBER 8435

TITLE POST TYPE INSULATOR TR-214

REF. TR-214





Reference	Color
084351111	LT. GRAY No. 70
084351101	BROWN

NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, in (mm)	43	(1092)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	2000	(9)
TENSILE STRENGTH, pounds (kN)	14000	(62.2)
TORSION STRENGTH, In-pounds (kN-m)	12000	(1.35)
COMPRESSION STRENGTH, pounds (kN)	15000	(66.7)

ELECTRICAL VALUES

VOLTAGE CLASS, kV	46
CRITICAL IMPULSE FLASHOVER, POS., kV	280
LOW FREQUENCY WET WITHSTAND, kv	100
IMPULSE WITHSTAND, kV	250

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	30
MAXIMUM RIT AT 1000 kHz, MICROVOLTS	200

DWG. No. P:8435 /8435-CLIENTE	DWG. No.TYPE SALES		Autocad 2000	DWN. L.E. RINCÓN	APP. A.I.PÉREZ

REVISION HISTORY	DATE
DRAWING CREATED	2010-01-15

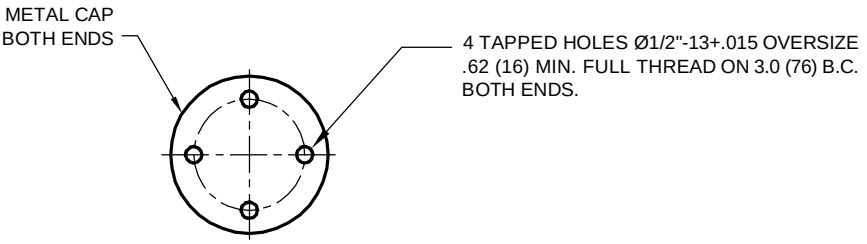
GAMMA corona

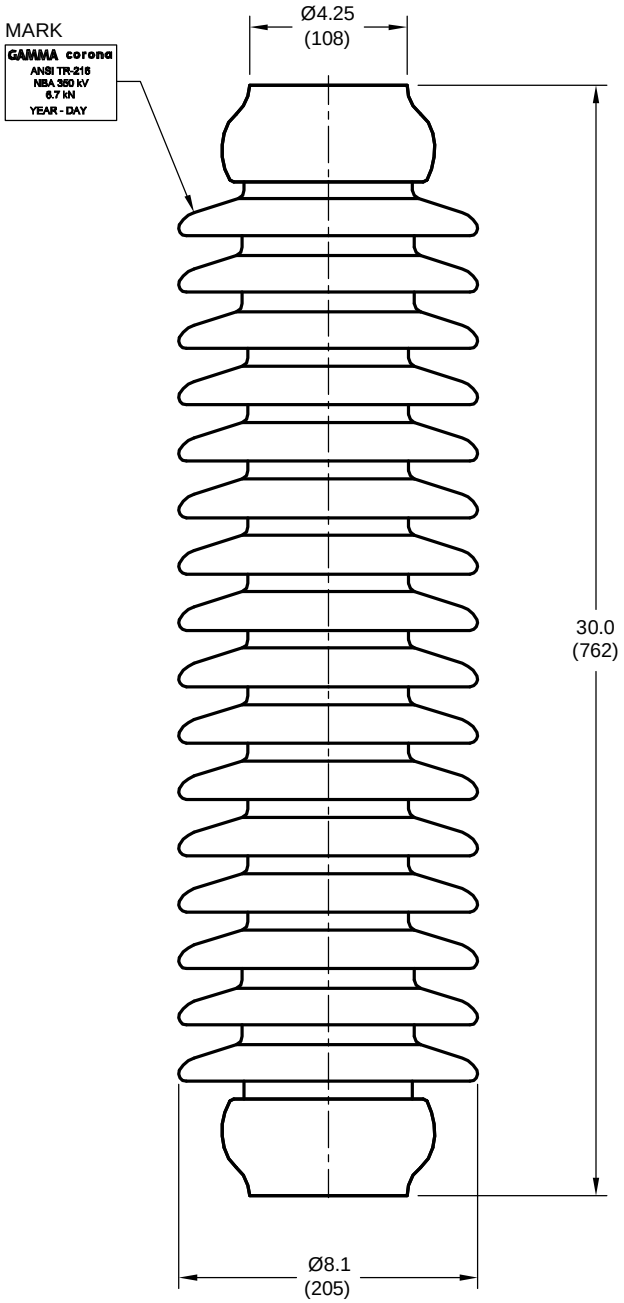
in. (mm)

PART NUMBER 8436

TITLE POST TYPE INSULATOR TR-216

REF. TR-216





Reference	Color
084361111	LT. GRAY No. 70
084361101	BROWN

NOTES

1. DIMENSIONS ARE INCHES (MILIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM-A153
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9.

DIMENSIONS

LEAKAGE DISTANCE, in (mm)	72	(1829)

MECHANICAL VALUES

CANTILEVER STRENGTH, pounds (kN)	1500	(6.7)
TENSILE STRENGTH, pounds (kN)	16000	(71.2)
TORSION STRENGTH, In-pounds (kN-m)	15000	(1.69)
COMPRESSION STRENGTH, pounds (kN)	25000	(111.2)

ELECTRICAL VALUES

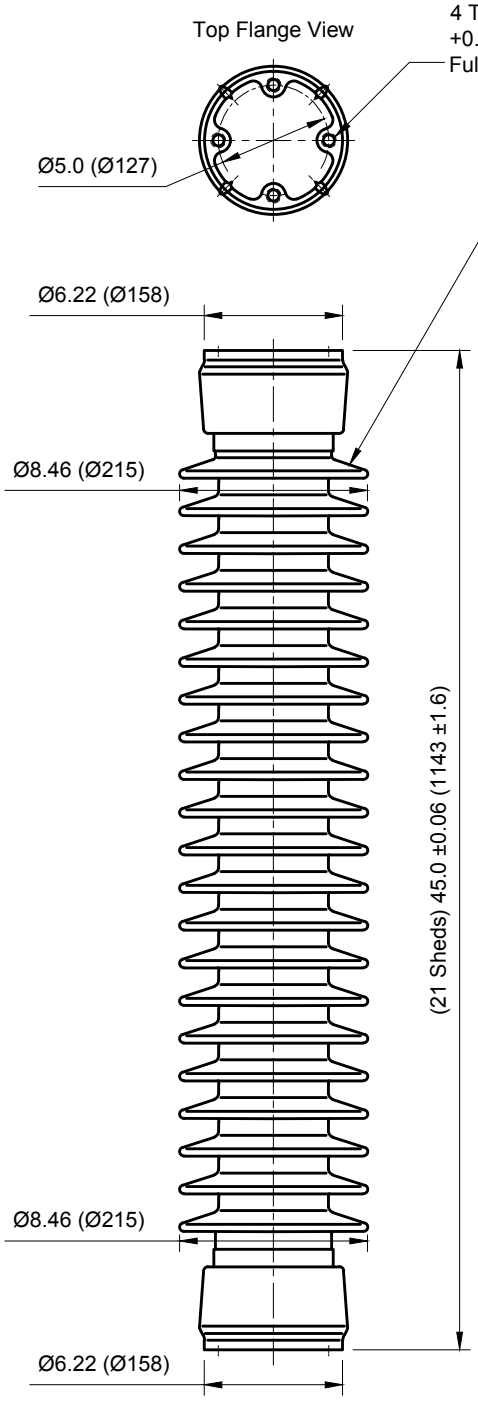
VOLTAGE CLASS, kV	69
CRITICAL IMPULSE FLASHOVER, POS., kV	390
LOW FREQUENCY WET WITHSTAND, kv	145
IMPULSE WITHSTAND, kV	350

RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	44
MAXIMUM RIT AT 1000 kHz, MICROVOLTS	200

DWG. No. P:8436 /8436-CLIENTE	DWG. No.TYPE SALES		Autocad 2000	DWN. L.E. RINCÓN	APP. A.I.PÉREZ

Technical reference number:		in (mm)	PART NUMBER
TR 286	GAMMA | CERISOL EUROPE		286SU0550
BIL 550 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
286SU0550
TR286
SC907

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S2907EJ	TR286 SC907	143 lb 65 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	101	(2565)
MINIMUM LEAKAGE DISTANCE; In (mm)	99	(2515)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1700	(7562)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1700	(7562)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	610
LOW FREQUENCY WET WITHSTAND, kV	230
IMPULSE WITHSTAND, kV	550

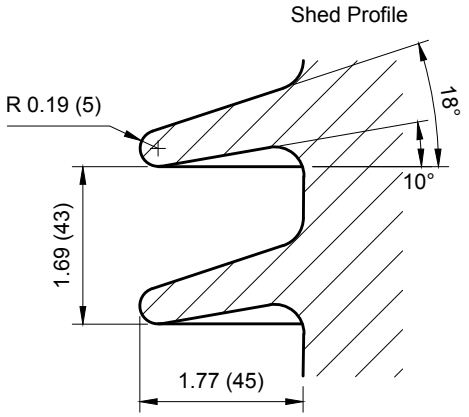
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	73
MAXIMUM RIV AT 1 MHz, µV	200

Other characteristics:

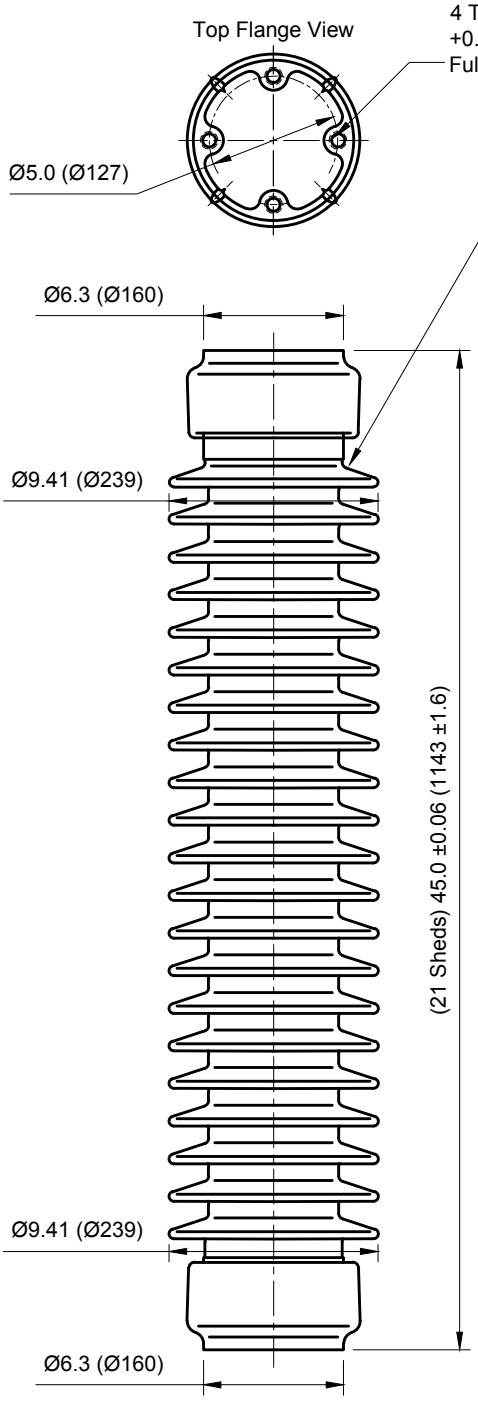
Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.



DWG. No.: H21286EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 287	GAMMA | CERISOL EUROPE		287HU0550
BIL 550 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
287HU0550
TR287
SC914

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S2914EJ	TR287 SC914	172 lb 78 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	101	(2565)
MINIMUM LEAKAGE DISTANCE; In (mm)	99	(2515)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	2600	(11565)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	2600	(11565)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(112000)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	610
LOW FREQUENCY WET WITHSTAND, kV	230
IMPULSE WITHSTAND, kV	550

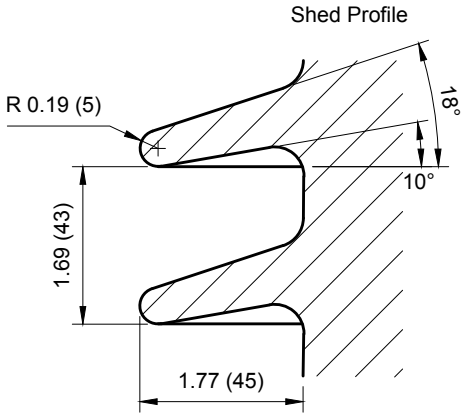
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	73
MAXIMUM RIV AT 1 MHz, µV	200

Other characteristics:

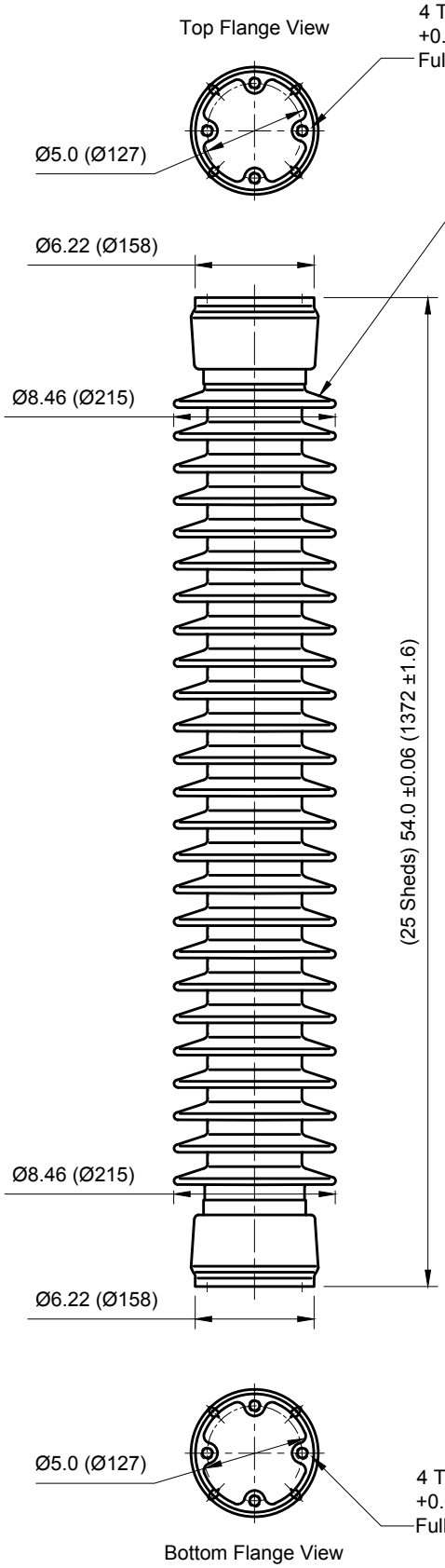
Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.



DWG. No.: H21287EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 288	GAMMA | CERISOL EUROPE		288SU0650
BIL 650 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
288SU0650
TR288
SC6905

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S26905EJ	TR288 SC6905	159 lb 72 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	121	(3073)
MINIMUM LEAKAGE DISTANCE; In (mm)	116	(2946)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1400	(6227)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1400	(6227)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	710
LOW FREQUENCY WET WITHSTAND, kV	275
IMPULSE WITHSTAND, kV	650

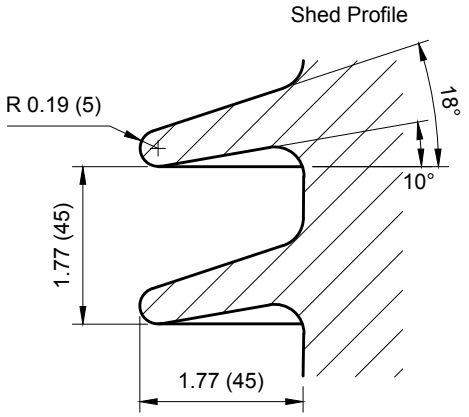
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	88
MAXIMUM RIV AT 1 MHz, µV	200

Other characteristics:

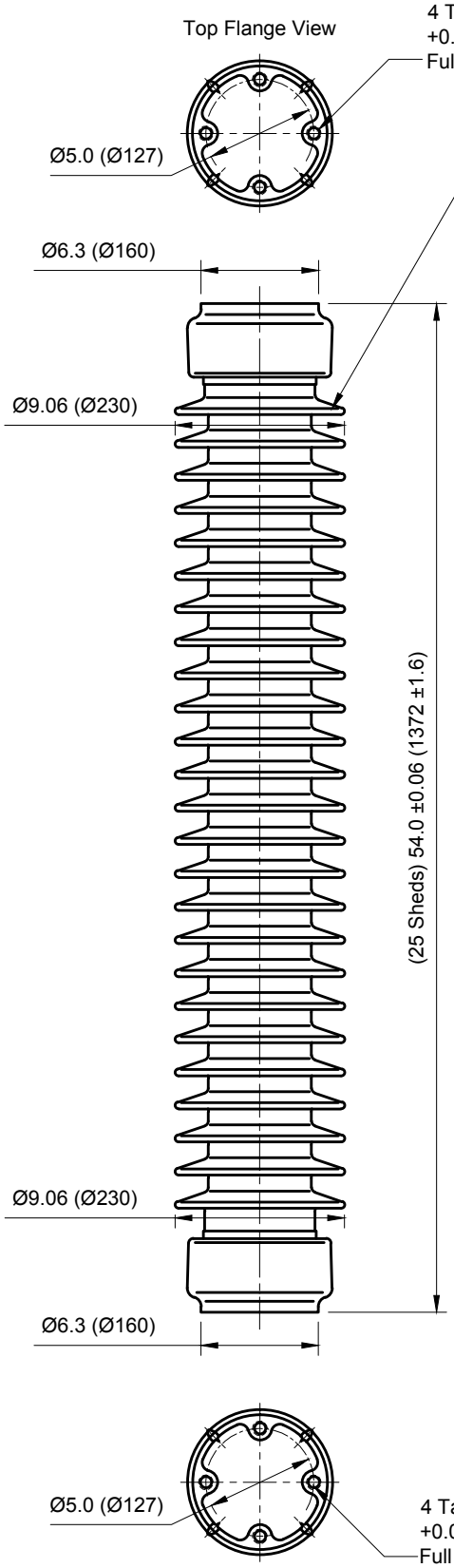
Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.



DWG. No.: H21288EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 289	GAMMA | CERISOL EUROPE		289HU0650
BIL 650 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
289HU0650
TR289
SC913

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S2913EJ	TR289 SC913	201 lb 91 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	121	(3073)
MINIMUM LEAKAGE DISTANCE; In (mm)	116	(2946)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	2200	(9786)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	2200	(9786)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	710
LOW FREQUENCY WET WITHSTAND, kV	275
IMPULSE WITHSTAND, kV	650

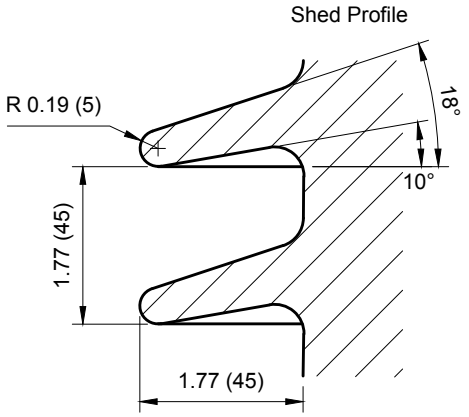
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	88
MAXIMUM RIV AT 1 MHz, µV	200

Other characteristics:

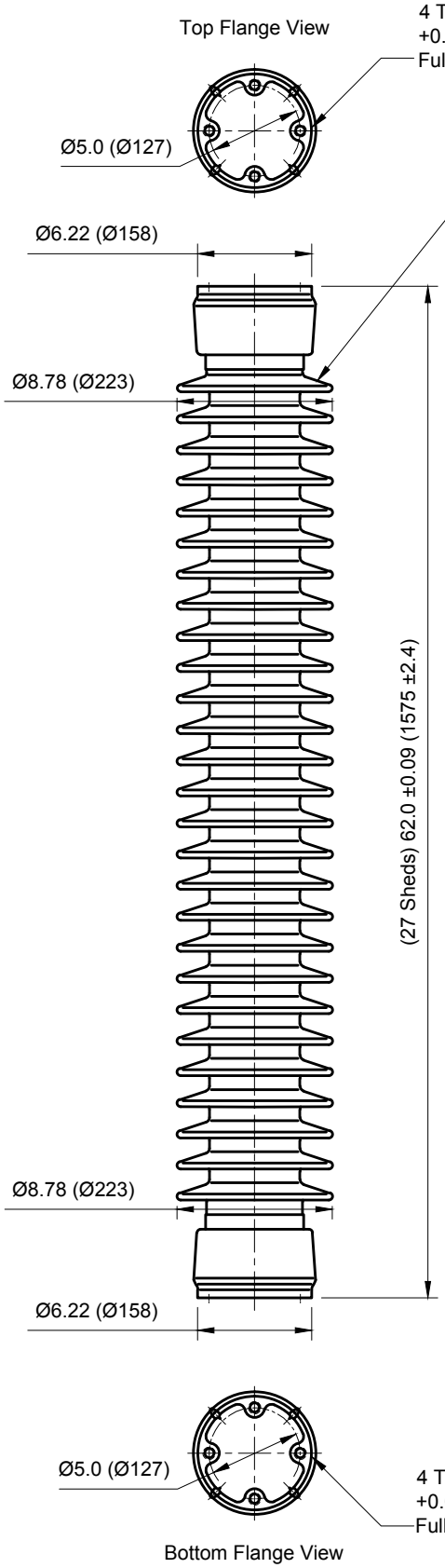
Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.



DWG. No.: H21289EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 291	GAMMA | CERISOL EUROPE		291SU0750
BIL 750 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
291SU0750
TR291
SC911

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S2911EJ	TR291 SC911	185 lb 84 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	134	(3404)
MINIMUM LEAKAGE DISTANCE; In (mm)	132	(3353)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1200	(5338)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1200	(5338)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	810
LOW FREQUENCY WET WITHSTAND, kV	315
IMPULSE WITHSTAND, kV	750

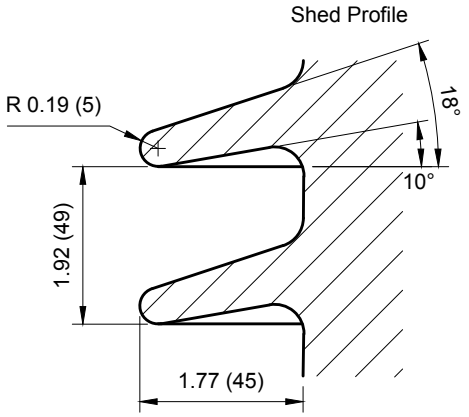
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	103
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

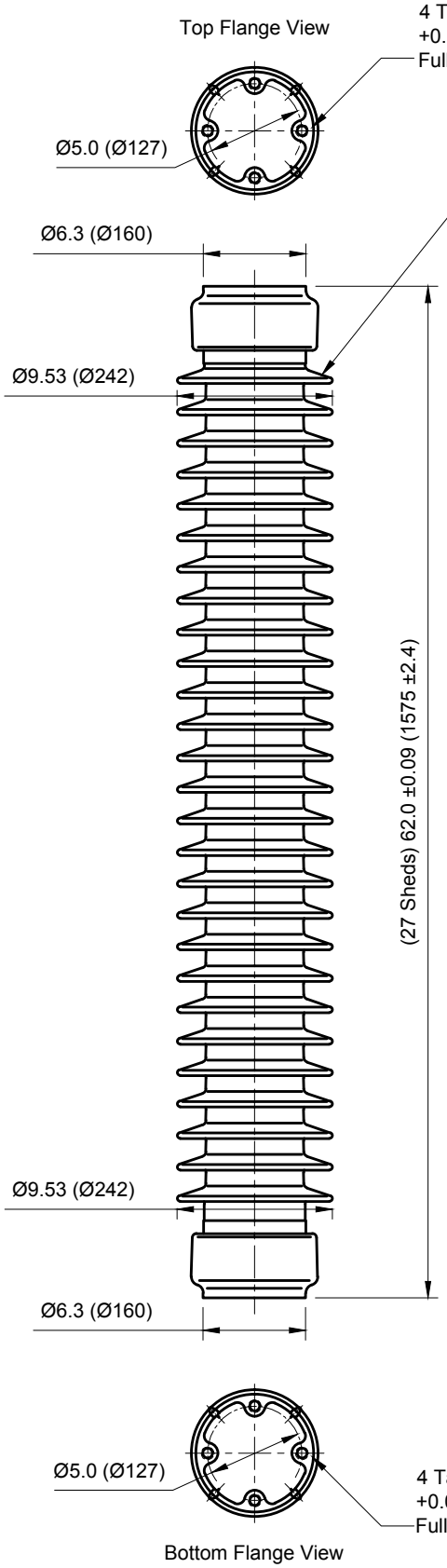
Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.



DWG. No.: H21291EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 295	GAMMA CERISOL EUROPE		295HU0750
BIL 750 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA CERISOL EUROPE
Year-month
Serial number
295HU0750
TR295
SC916

Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom
S2916EJ	TR295 SC916	230 lb 104 kg	4 holes 5/8-11UNC 4 holes 5/8-11UNC

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	134	(3404)
MINIMUM LEAKAGE DISTANCE; In (mm)	132	(3353)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1850	(8229)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1850	(8229)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	810
LOW FREQUENCY WET WITHSTAND, kV	315
IMPULSE WITHSTAND, kV	750

RADIO INFLUENCE VOLTAGE

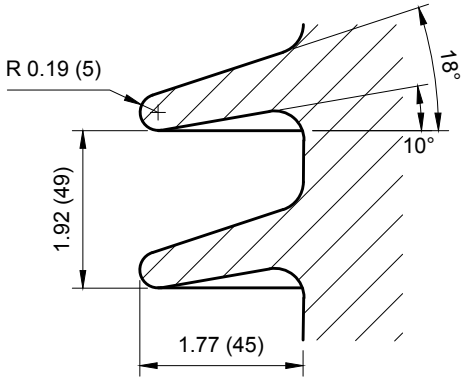
TEST VOLTAGE, RMS TO GROUND, kV	103
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

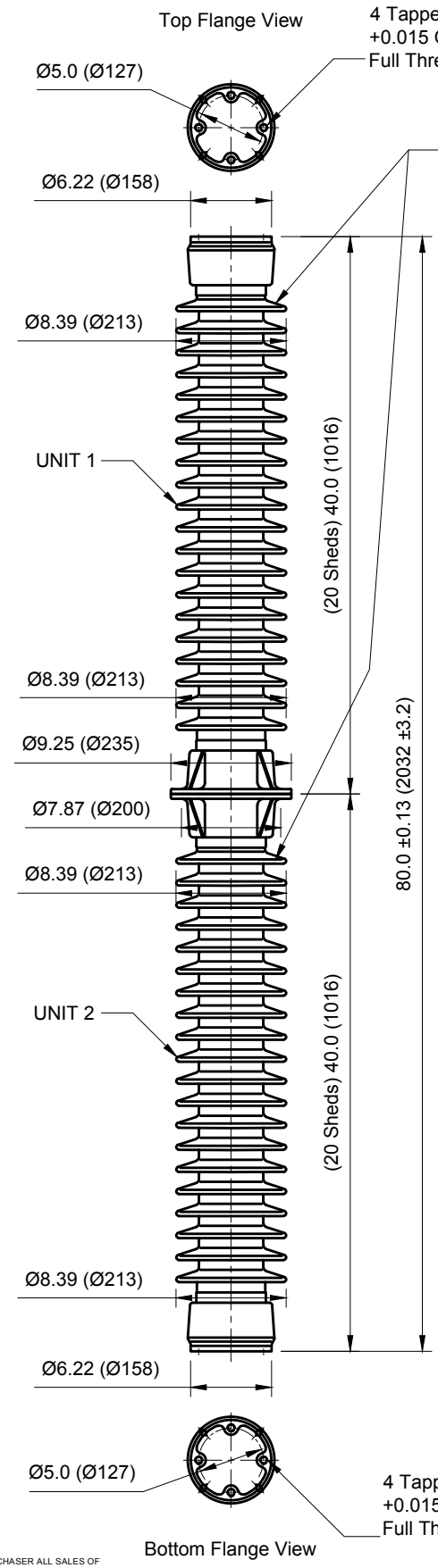
Metal parts assembled with Portland cement.

Shed Profile



DWG. No.: H21295EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 304	GAMMA | CERISOL EUROPE		304SU0900
BIL 900 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH



Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
304SU0900
TR304
SC912

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S2912EJ	TR304 SC912	128 lb 58 kg	4 holes 5/8-11UNC 4xØ18xØ200	4xM16 Bolts 4xM16 Nuts 4 Washers
UNIT 2	S3912EJ	TR304 SC912	128 lb 58 kg	4xØ18xØ200 4 holes 5/8-11UNC	
	Total Weight:		256 lb 116 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	171	(4343)
MINIMUM LEAKAGE DISTANCE; In (mm)	165	(4191)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	950	(4226)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	950	(4226)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1010
LOW FREQUENCY WET WITHSTAND, kV	385
IMPULSE WITHSTAND, kV	900

RADIO INFLUENCE VOLTAGE

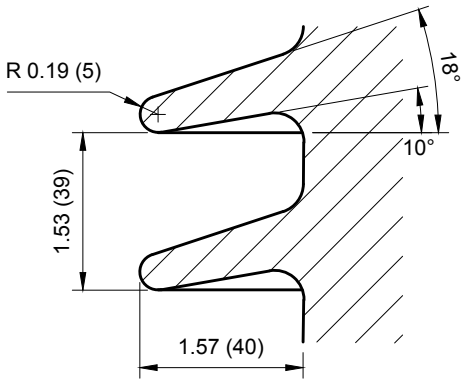
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

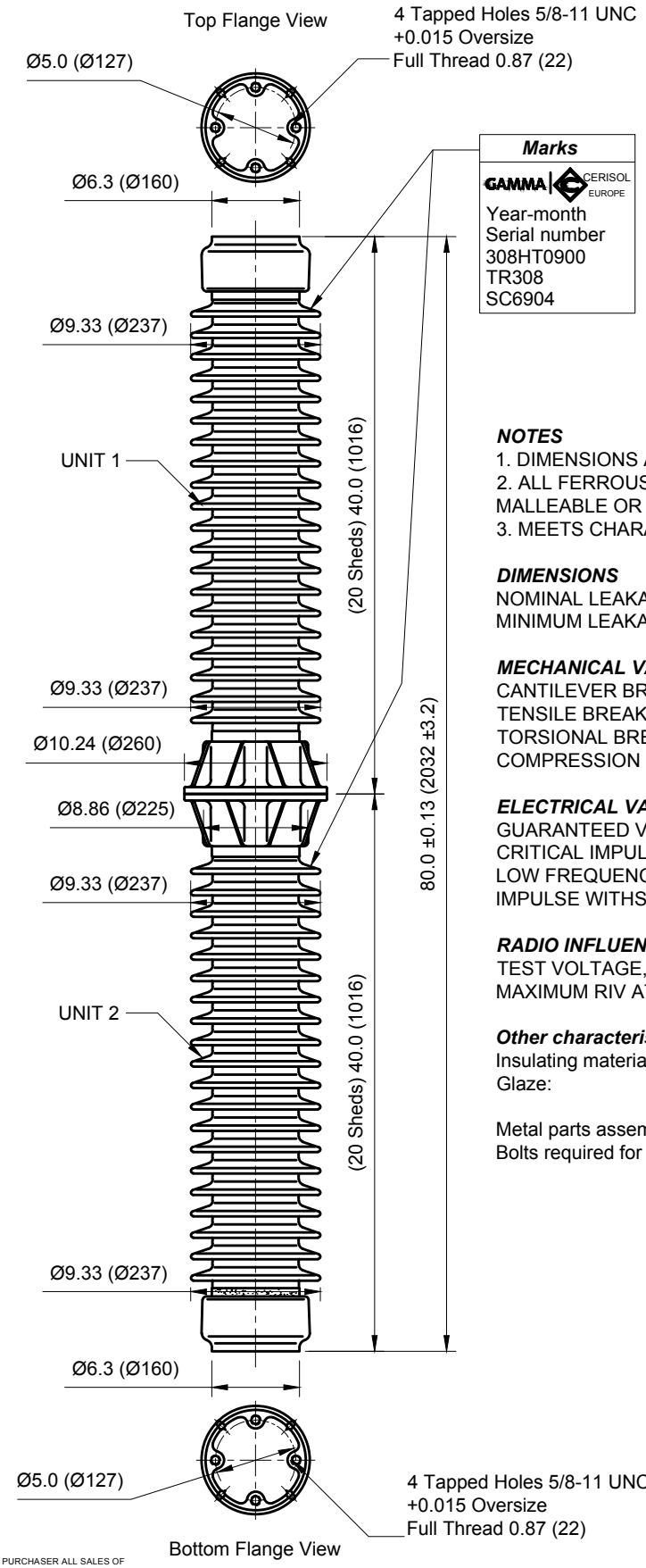
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21304EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 308	GAMMA | CERISOL EUROPE		308HT0900
BIL 900 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
308HT0900
TR308
SC6904

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S26904EJ	TR308 SC6904	174 lb 79 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S36904EJ	TR308 SC6904	174 lb 79 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		348 lb 158 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	170	(4318)
MINIMUM LEAKAGE DISTANCE; In (mm)	165	(4191)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1450	(6450)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1010
LOW FREQUENCY WET WITHSTAND, kV	385
IMPULSE WITHSTAND, kV	900

RADIO INFLUENCE VOLTAGE

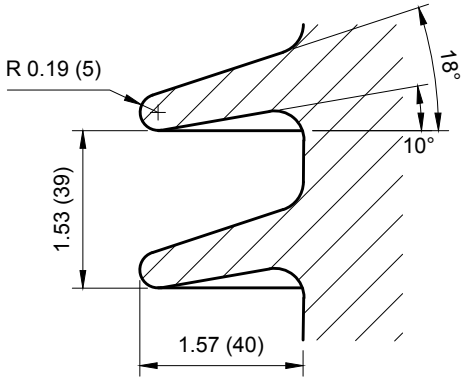
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

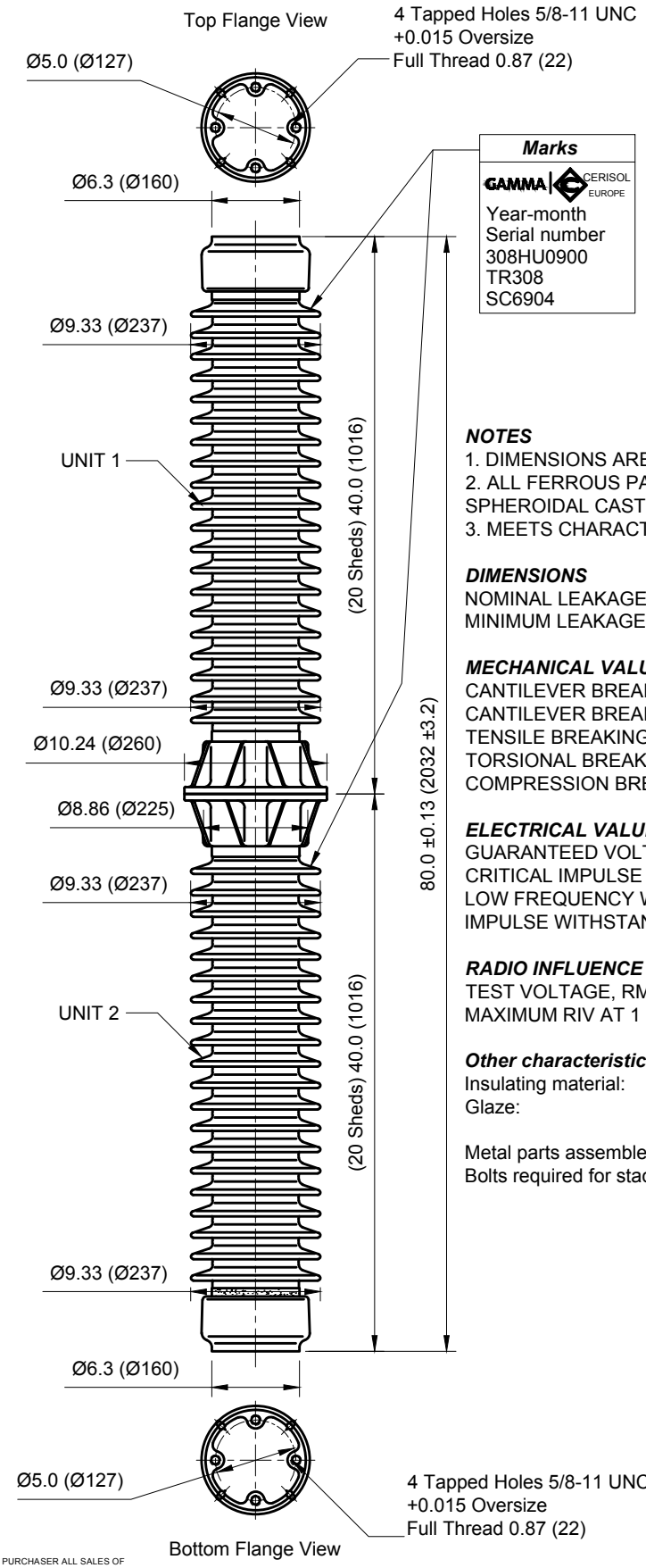
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21307EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 308	GAMMA | CERISOL EUROPE		308HU0900
BIL 900 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
308HU0900
TR308
SC6904

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S26904EJ	TR308 SC6904	174 lb 79 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S36904EJ	TR308 SC6904	174 lb 79 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		348 lb 158 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	170	(4318)
MINIMUM LEAKAGE DISTANCE; In (mm)	165	(4191)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1450	(6450)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1450	(6450)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1010
LOW FREQUENCY WET WITHSTAND, kV	385
IMPULSE WITHSTAND, kV	900

RADIO INFLUENCE VOLTAGE

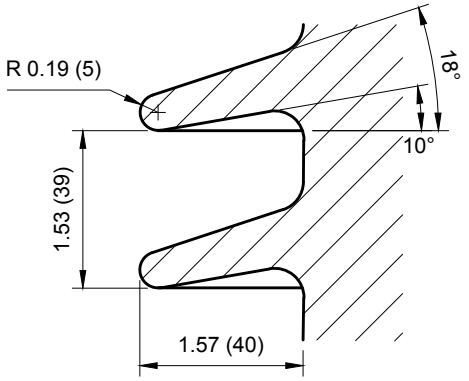
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

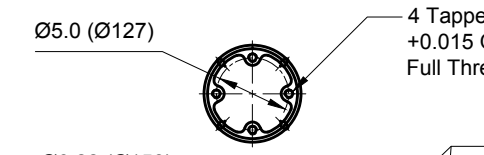
Shed Profile (Unit 1,2)

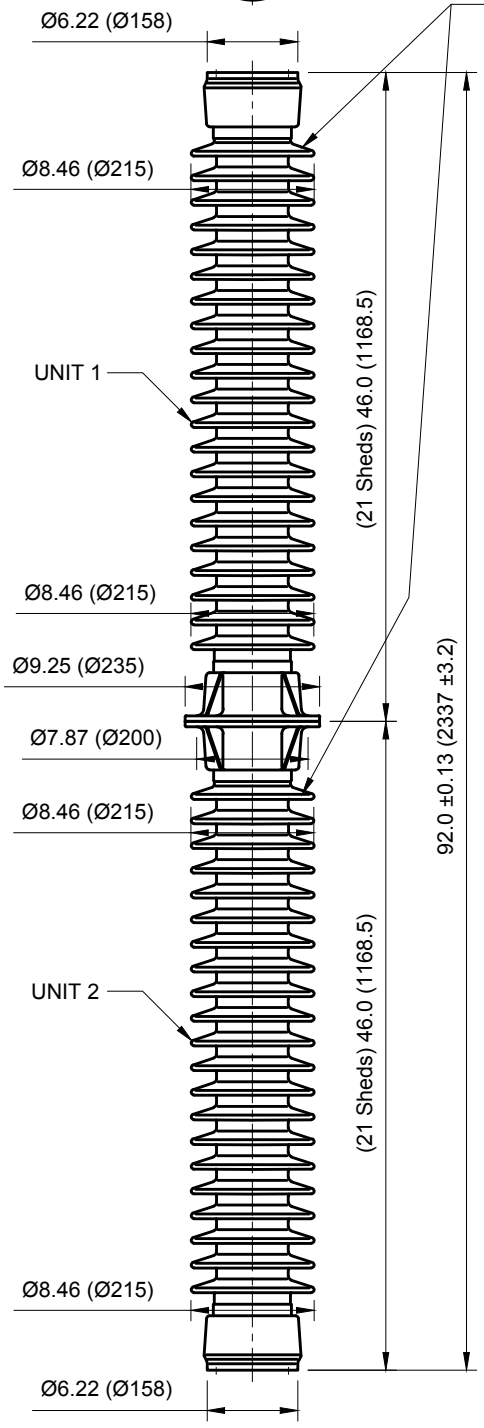


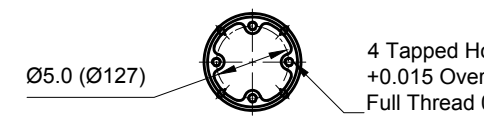
DWG. No.: H21308EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 312	GAMMA | CERISOL EUROPE		312ST1050
BIL 1050 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH

Top Flange View







Bottom Flange View

Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
312ST1050
TR312
SC907

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S3907MJ	TR312 SC907	137 lb 62 kg	4 holes 5/8-11UNC 4xØ18xØ200	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S4907MJ	TR312 SC907	137 lb 62 kg	4xØ18xØ200 4 holes 5/8-11UNC	
	Total Weight:		274 lb 124 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	202	(5131)
MINIMUM LEAKAGE DISTANCE; In (mm)	198	(5030)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	800	(3558)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1210
LOW FREQUENCY WET WITHSTAND, kV	455
IMPULSE WITHSTAND, kV	1050

RADIO INFLUENCE VOLTAGE

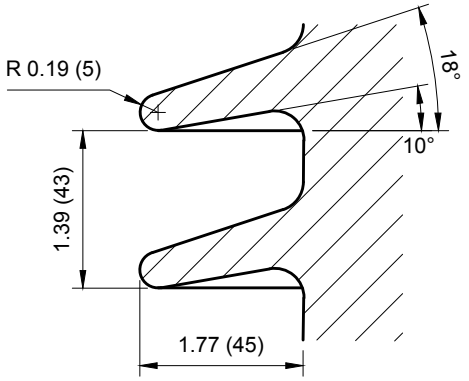
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

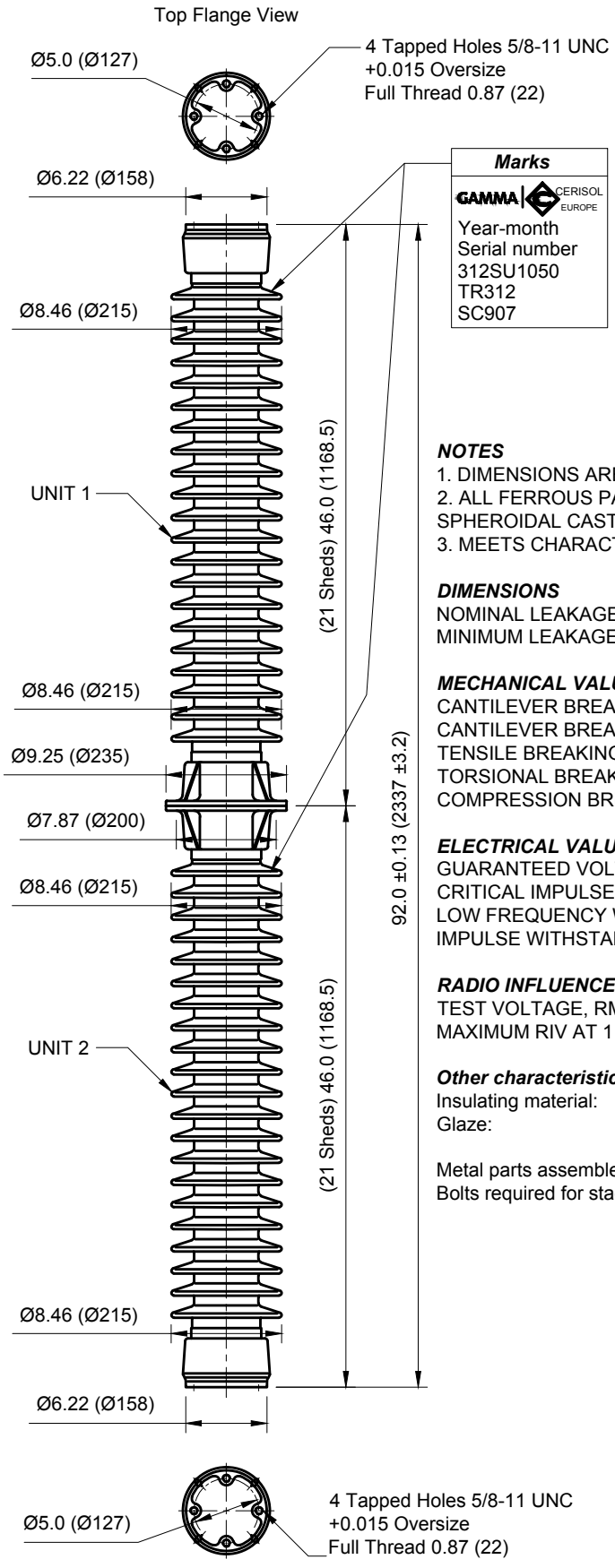
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21312EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 312 U	GAMMA | CERISOL EUROPE	312SU1050
BIL 1050 kV	in (mm)	TITLE: STATION POST INSULATOR. STANDARD STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
312SU1050
TR312
SC907

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S3907MJ	TR312 SC907	137 lb 62 kg	4 holes 5/8-11UNC 4xØ18xØ200	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S4907MJ	TR312 SC907	137 lb 62 kg	4xØ18xØ200 4 holes 5/8-11UNC	
	Total Weight:		274 lb 124 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	202	(5131)
MINIMUM LEAKAGE DISTANCE; In (mm)	198	(5030)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	800	(3558)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	800	(3558)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1210
LOW FREQUENCY WET WITHSTAND, kV	455
IMPULSE WITHSTAND, kV	1050

RADIO INFLUENCE VOLTAGE

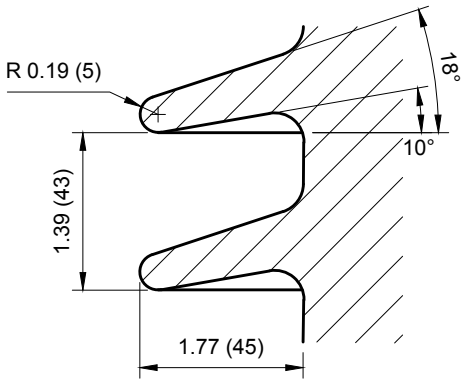
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

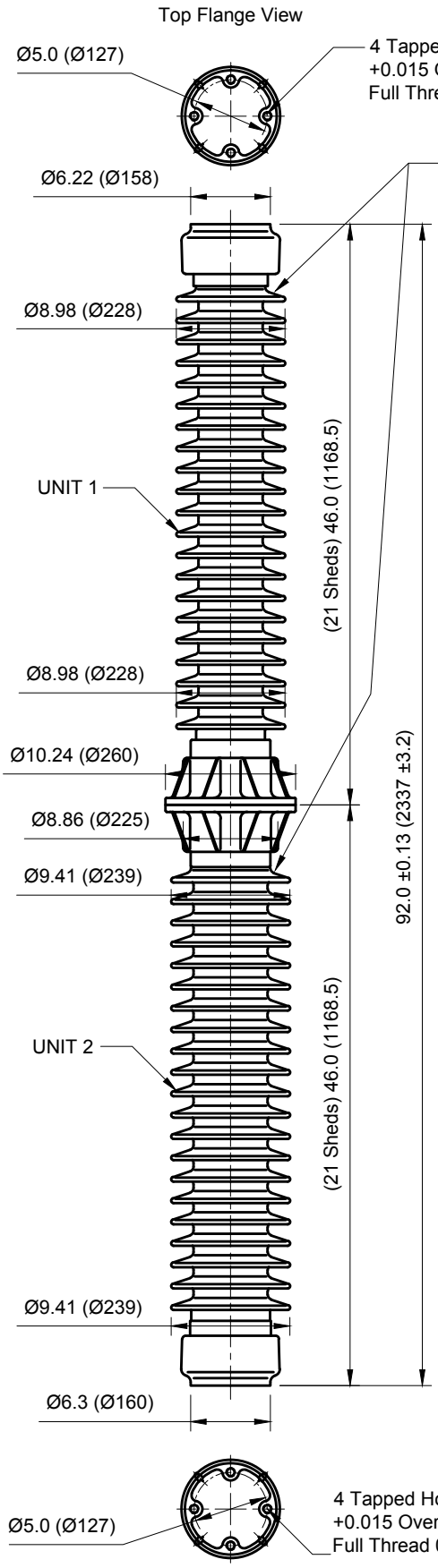
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21313EJ	DWG: TYPE SALES	Date: 2015/07/22	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 316	GAMMA | CERISOL EUROPE		316HT1050
BIL 1050 kV		TITLE	STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
316HT1050
TR316
SC924 (Unit 1)
SC914 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S2924EJ	TR316 SC924	155 lb 70 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S4914MJ	TR316 SC914	183 lb 83 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		338 lb 153 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	202	(5131)
MINIMUM LEAKAGE DISTANCE; In (mm)	198	(5030)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1250	(5560)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1210
LOW FREQUENCY WET WITHSTAND, kV	455
IMPULSE WITHSTAND, kV	1050

RADIO INFLUENCE VOLTAGE

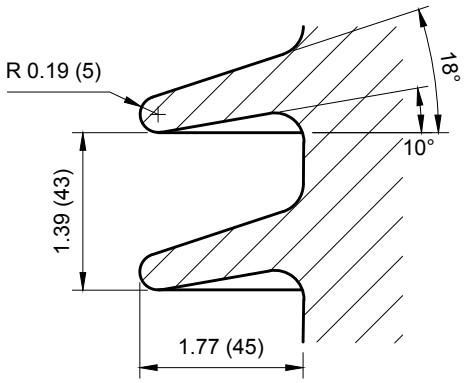
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

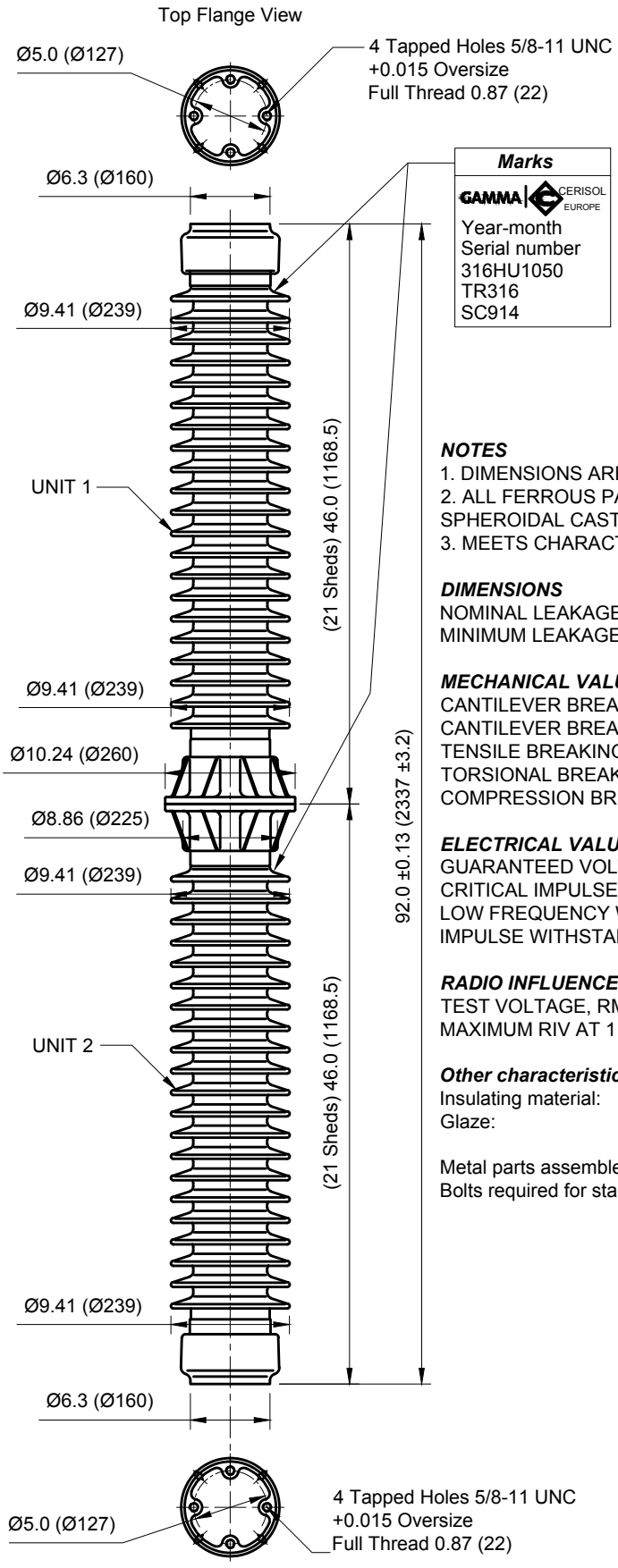
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21316EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 316 U	GAMMA | CERISOL EUROPE	316HU1050
BIL 1050 kV	in (mm)	TITLE: STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
316HU1050
TR316
SC914

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S3914MJ	TR316 SC914	183 lb 83 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	S4914MJ	TR316 SC914	183 lb 83 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		366 lb 166 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	202	(5131)
MINIMUM LEAKAGE DISTANCE; In (mm)	198	(5030)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1250	(5560)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1250	(5560)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1210
LOW FREQUENCY WET WITHSTAND, kV	455
IMPULSE WITHSTAND, kV	1050

RADIO INFLUENCE VOLTAGE

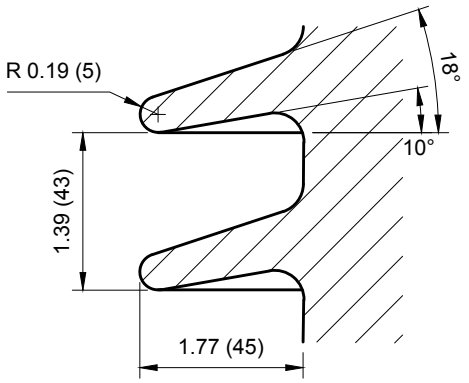
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

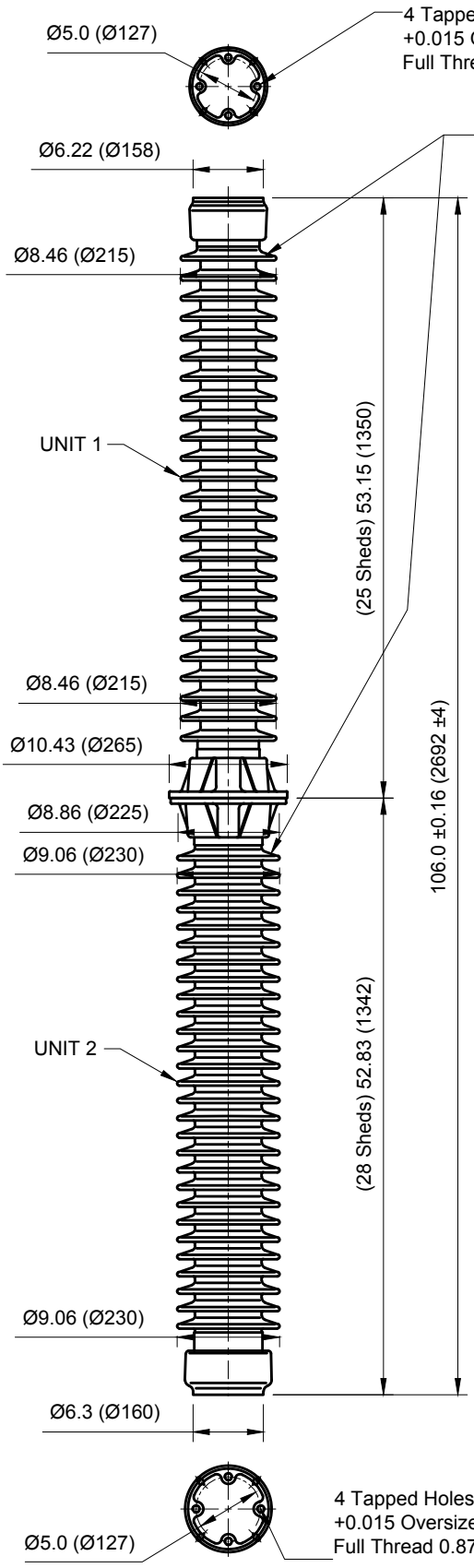
Shed Profile (Unit 1,2)



DWG. No.: H21317EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 324	GAMMA | CERISOL EUROPE		324ST1300
BIL 1300 kV		TITLE	STATION POST INSULATOR. STANDARD STRENGTH

Top Flange View



Bottom Flange View

Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
324ST1300
TR324
SC905 (Unit 1)
SC915 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SJ905PJ	TR324 SC905	166 lb 75 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4xB16 Washers
UNIT 2	SJ915EJ	TR324 SC915	201 lb 91 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		367 lb 166 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	234	(5944)
MINIMUM LEAKAGE DISTANCE; In (mm)	231	(5867)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1000	(4448)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1410
LOW FREQUENCY WET WITHSTAND, kV	525
IMPULSE WITHSTAND, kV	1300

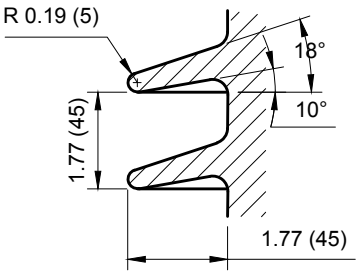
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

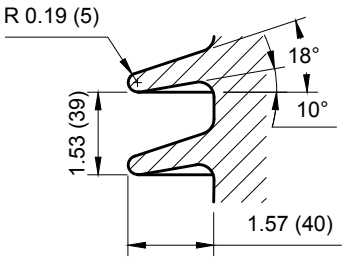
Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.



Shed Profile (Unit 1)

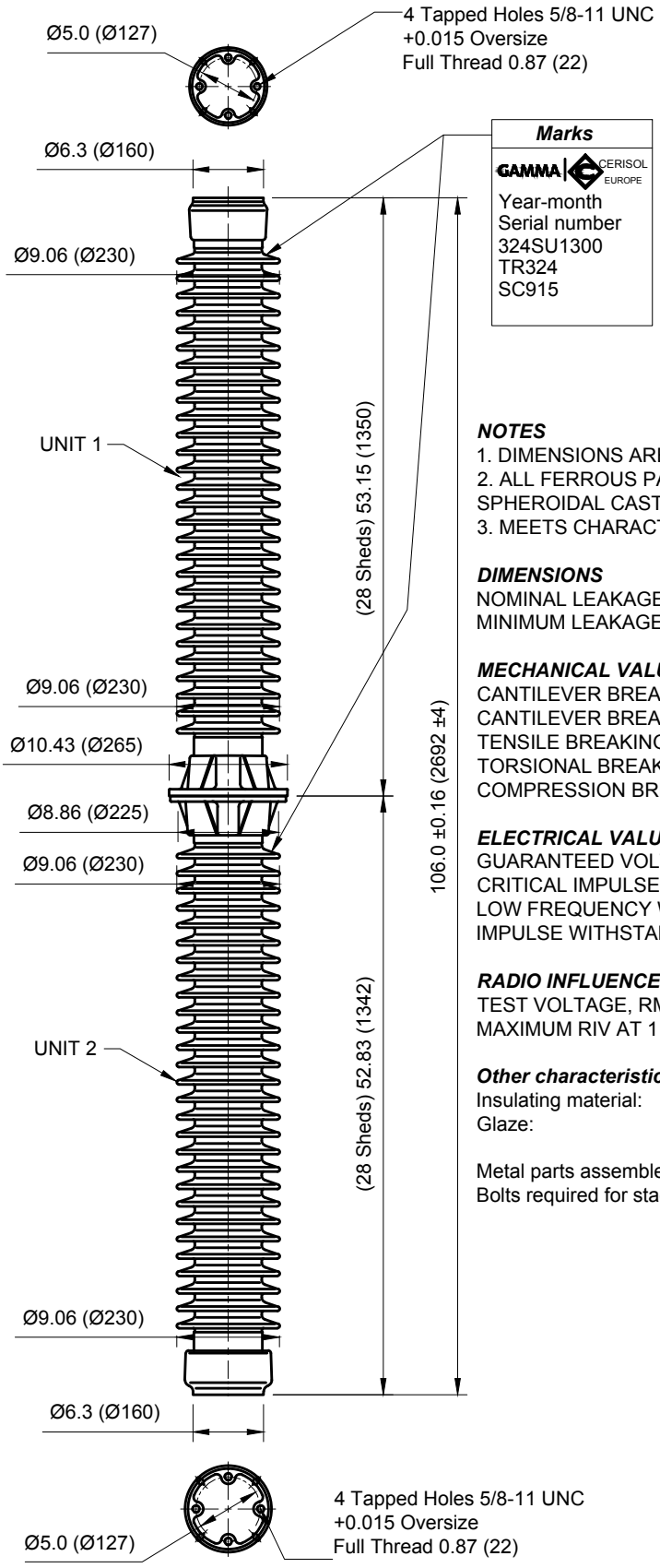


Shed Profile (Unit 2)

DWG. No.: H21324EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 324 U	GAMMA CERISOL EUROPE	324SU1300
BIL 1300 kV	in (mm)	TITLE: STATION POST INSULATOR. STANDARD STRENGTH

Top Flange View



Bottom Flange View

Marks
GAMMA CERISOL EUROPE
Year-month
Serial number
324SU1300
TR324
SC915

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SW915EJ	TR324 SC915	201 lb 91 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x Washers
UNIT 2	SJ915EJ	TR324 SC915	201 lb 91 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		367 lb 166 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	238	(6045)
MINIMUM LEAKAGE DISTANCE; In (mm)	231	(5867)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1000	(4448)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1000	(4448)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1410
LOW FREQUENCY WET WITHSTAND, kV	525
IMPULSE WITHSTAND, kV	1300

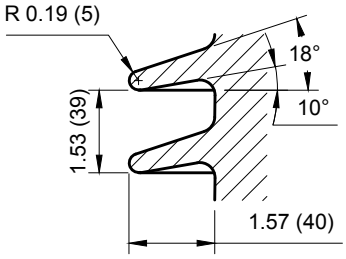
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

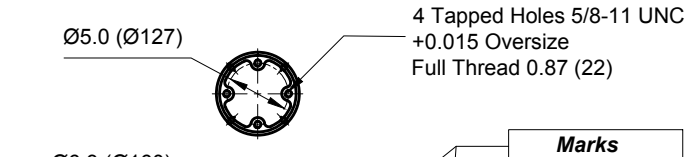


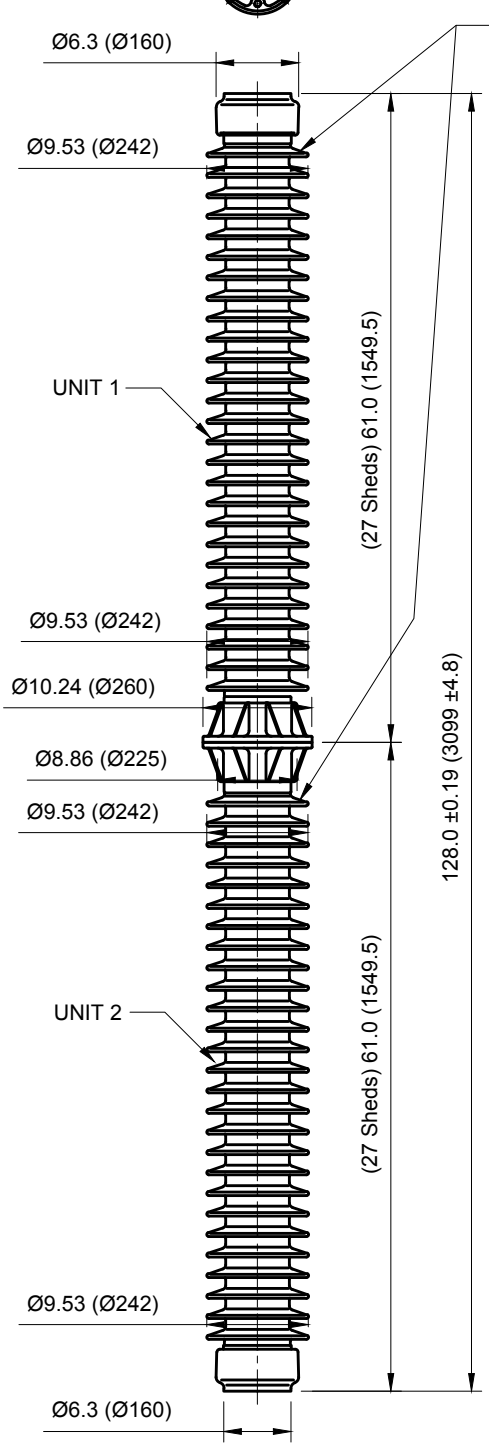
Shed Profile

DWG. No.: H21325EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 330 U	GAMMA | CERISOL EUROPE	330SU1470
BIL 1470 kV	in (mm)	TITLE: STATION POST INSULATOR. STANDARD STRENGTH

Top Flange View





Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
330SU1470
TR330
SC916

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SM916PJ	TR330 SC916	230 lb 104 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x washers
UNIT 2	SN916PJ	TR330 SC916	230 lb 104 kg	4xØ18xØ225 4 holes 5/8-11UNC	
	Total Weight:		460 lb 208 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	267	(6782)
MINIMUM LEAKAGE DISTANCE; In (mm)	264	(6706)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	900	(4003)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	900	(4003)
TENSILE BREAKING STRENGTH, pounds (N)	25000	(111200)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	90000	(10170)
COMPRESSION BREAKING STRENGTH, pounds (N)	75000	(333600)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1610
LOW FREQUENCY WET WITHSTAND, kV	590
IMPULSE WITHSTAND, kV	1470

RADIO INFLUENCE VOLTAGE

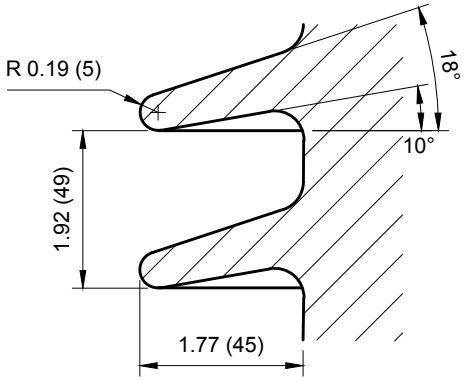
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

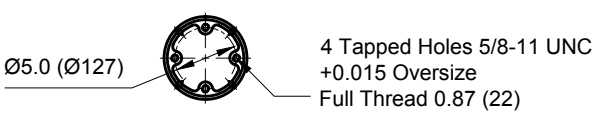
Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)

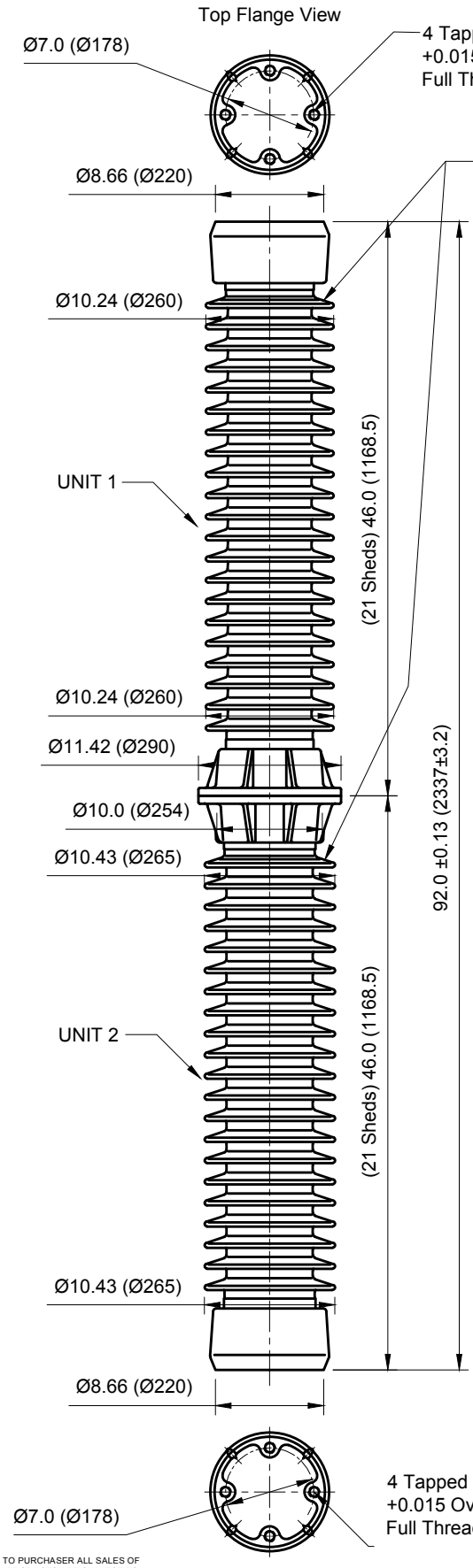




Bottom Flange View

DWG. No.: H21330EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 362 U	GAMMA | CERISOL EUROPE	362EU1050
BIL 1050 kV	in (mm)	TITLE: STATION POST INSULATOR. EXTRA HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
362EU1050
TR362
SC8923 (UNIT1)
SC918 (UNIT2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S28923EJ	TR362 SC8923	256 lb 116 kg	4 holes 3/4-10UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 8x washers
UNIT 2	S4918EJ	TR362 SC918	265 lb 120 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		521 lb 236 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	202	(5131)
MINIMUM LEAKAGE DISTANCE; In (mm)	198	(5030)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	2300	(10230)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	2300	(10230)
TENSILE BREAKING STRENGTH, pounds (N)	40000	(177920)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	120000	(13560)
COMPRESSION BREAKING STRENGTH, pounds (N)	100000	(444800)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1210
LOW FREQUENCY WET WITHSTAND, kV	455
IMPULSE WITHSTAND, kV	1050

RADIO INFLUENCE VOLTAGE

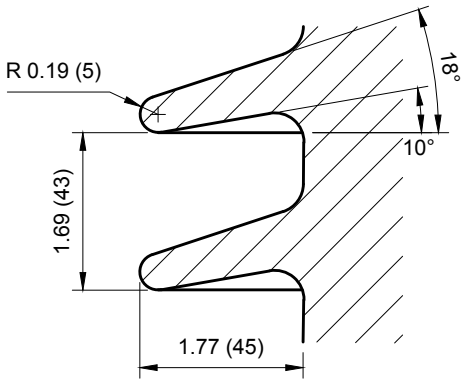
TEST VOLTAGE, RMS TO GROUND, kV	146
MAXIMUM RIV AT 1 MHz, µV	500

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

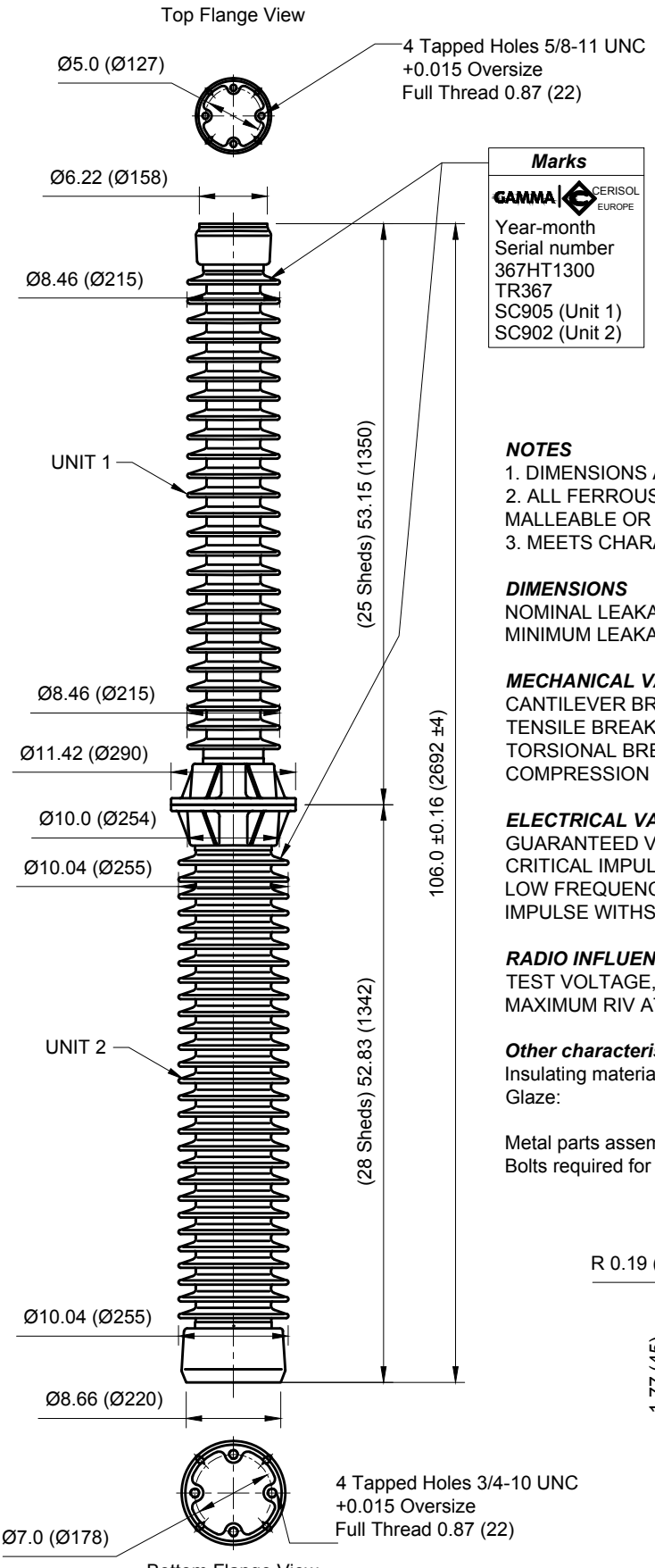
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21362EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 367	GAMMA | CERISOL EUROPE	367HT1300
BIL 1300 kV	in (mm)	TITLE: STATION POST INSULATOR. HIGH STRENGTH



Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
367HT1300
TR367
SC905 (Unit 1)
SC902 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SJ905MJ	TR367 SC905	166 lb 75 kg	4 holes 5/8-11UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 8x Washers
UNIT 2	SJ902MJ	TR367 SC902	285 lb 129 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		451 lb 204 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	234	(5944)
MINIMUM LEAKAGE DISTANCE; In (mm)	231	(5867)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1450	(6450)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4250)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

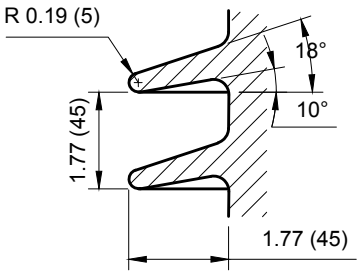
GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1410
LOW FREQUENCY WET WITHSTAND, kV	525
IMPULSE WITHSTAND, kV	1300

RADIO INFLUENCE VOLTAGE

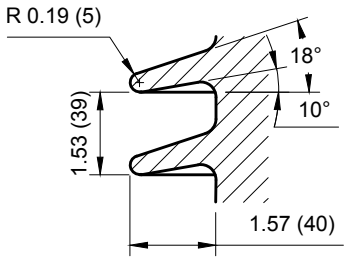
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:
Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.



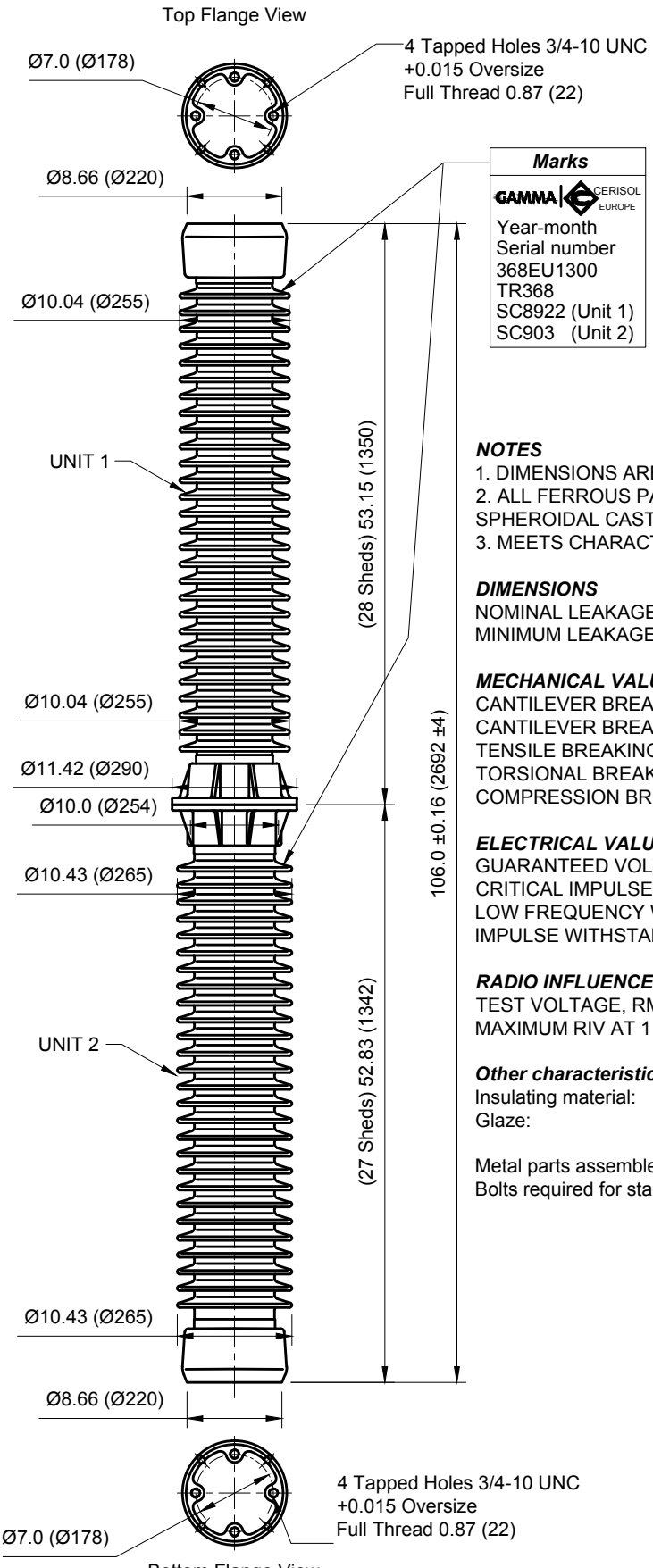
Shed Profile (Unit 1)



Shed Profile (Unit 2)

DWG. No.: H21367EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 368	GAMMA | CERISOL EUROPE		368EU1300
BIL 1300 kV		TITLE	STATION POST INSULATOR. EXTRA HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
368EU1300
TR368
SC8922 (Unit 1)
SC903 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S28922EJ	TR368 SC8922	296 lb 134 kg	4 holes 3/4-10UNC 8xØ18xØ255	8xM16 Bolts 8xM16 Nuts 8x Washers
UNIT 2	S2903MJ	TR368 SC903	302 lb 137 kg	8xØ18xØ255 4 holes 3/4-10UNC	
	Total Weight:		598 lb 271 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	234	(5944)
MINIMUM LEAKAGE DISTANCE; In (mm)	231	(5867)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	2050	(9118)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	2050	(9118)
TENSILE BREAKING STRENGTH, pounds (N)	40000	(177920)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	120000	(13560)
COMPRESSION BREAKING STRENGTH, pounds (N)	100000	(444880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1410
LOW FREQUENCY WET WITHSTAND, kV	525
IMPULSE WITHSTAND, kV	1300

RADIO INFLUENCE VOLTAGE

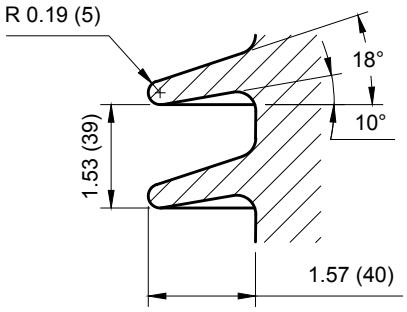
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:

Insulating material:	Al. Porcelain
Glaze:	Light Gray Munsell n° 70

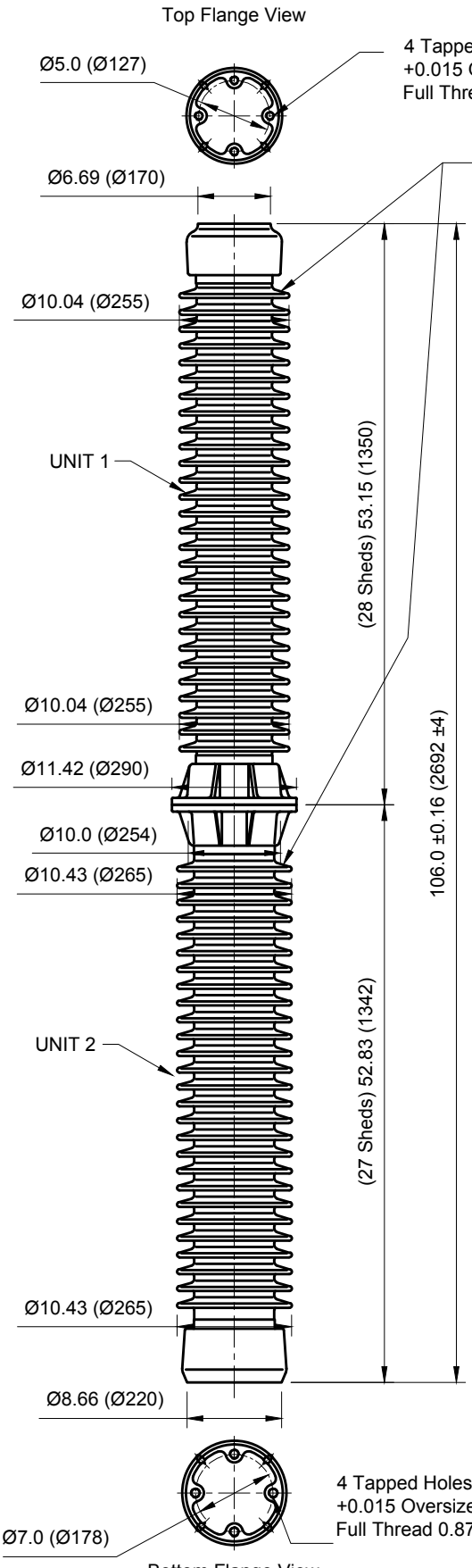
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21368EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 369	GAMMA | CERISOL EUROPE		369ET1300
BIL 1300 kV		TITLE	STATION POST INSULATOR. EXTRA HIGH STRENGTH



Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
369ET1300
TR369
SC902 (Unit 1)
SC903 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S26902EJ	TR369 SC6902	278 lb 126 kg	4 holes 5/8-11UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 8x Washers
UNIT 2	S26903EJ	TR369 SC6903	302 lb 137 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		580 lb 263 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	234	(5944)
MINIMUM LEAKAGE DISTANCE; In (mm)	231	(5867)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	2050	(9118)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1410
LOW FREQUENCY WET WITHSTAND, kV	525
IMPULSE WITHSTAND, kV	1300

RADIO INFLUENCE VOLTAGE

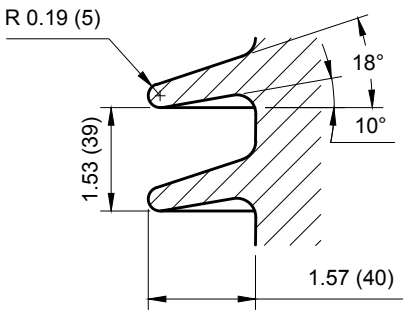
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

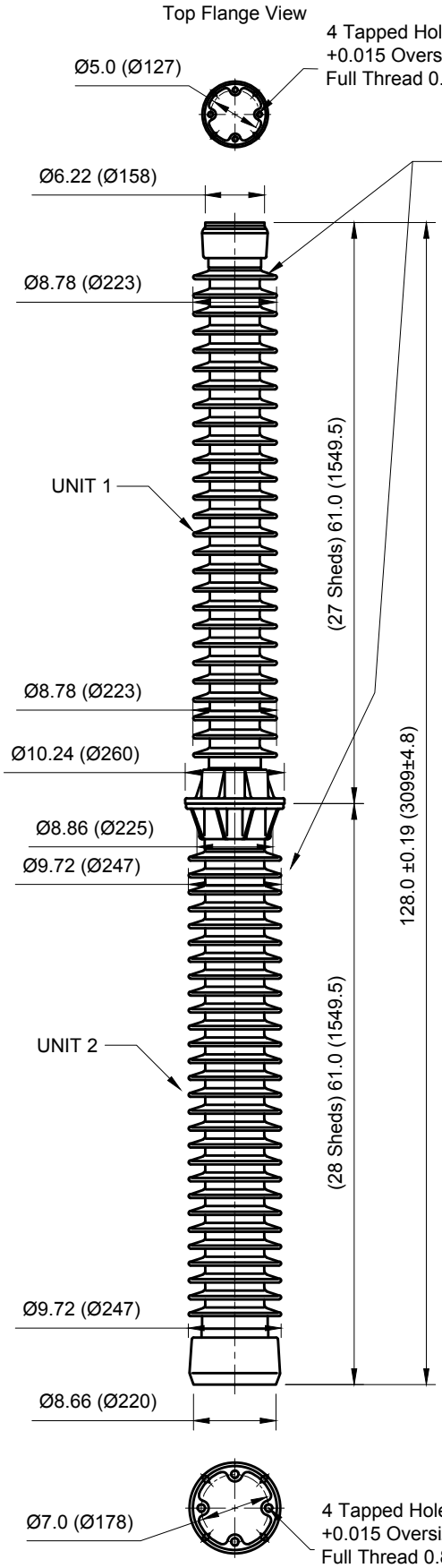
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21369EJ	DWG: TYPE SALES	Date: 2015/05/28	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 371	GAMMA | CERISOL EUROPE	371HT1470
BIL 1470 kV	in (mm)	TITLE: STATION POST INSULATOR. HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
371HT1470
TR371
SC911 (UNIT1)
SC919 (UNIT2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SL911MJ	TR371 SC911	194 lb 88 kg	4 holes 5/8-11UNC 4xØ18xØ225	4xM16 Bolts 4xM16 Nuts 4x washers
UNIT 2	S2919EJ	TR371 SC919	267 lb 121 kg	4xØ18xØ225 4 holes 3/4-10UNC	
	Total Weight:		461 lb 209 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	270	(6858)
MINIMUM LEAKAGE DISTANCE; In (mm)	264	(6706)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1170	(5204)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266800)

ELECTRICAL VALUES

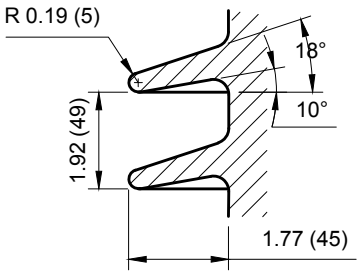
GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1610
LOW FREQUENCY WET WITHSTAND, kV	590
IMPULSE WITHSTAND, kV	1470

RADIO INFLUENCE VOLTAGE

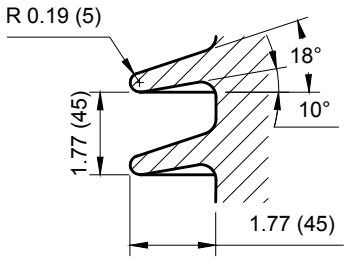
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:
Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.



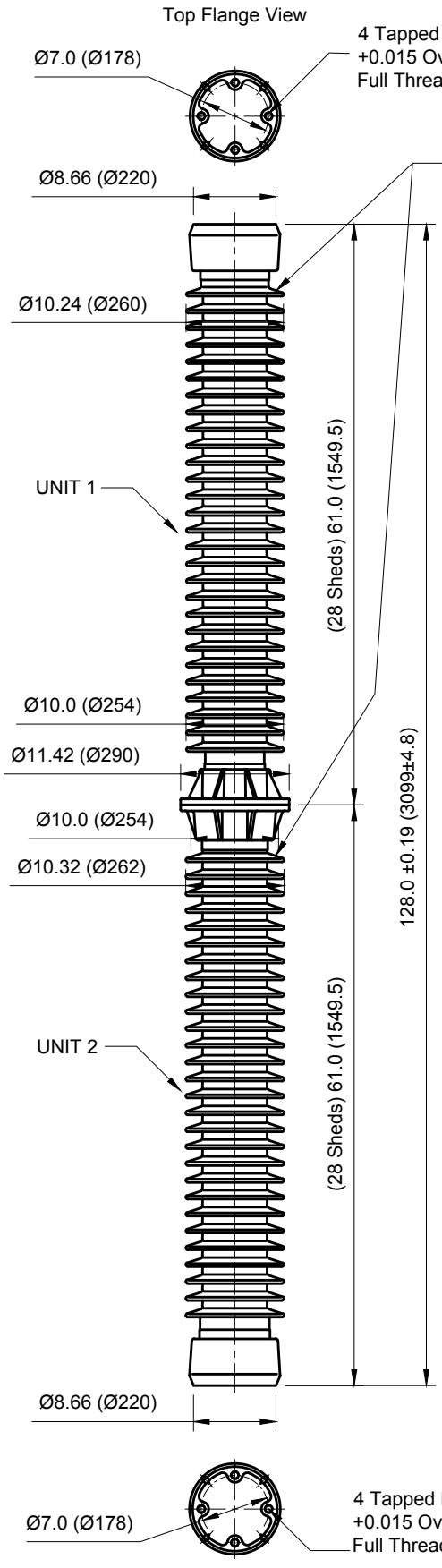
Shed Profile (Unit 1)



Shed Profile (Unit 2)

DWG. No.: H21371EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		in (mm)	PART NUMBER
TR 372	GAMMA | CERISOL EUROPE		372EU1470
BIL 1470 kV		TITLE	STATION POST INSULATOR. EXTRA HIGH STRENGTH



Marks
GAMMA | CERISOL EUROPE
Year-month
Serial number
372EU1470
TR372
SC921 (UNIT1)
SC920 (UNIT2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S28921EJ	TR372 SC921	322 lb 146 kg	4 holes 3/4-10UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 4x washers
UNIT 2	S2920MJ	TR372 SC920	309 lb 140 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		631 lb 286 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	271	(6883)
MINIMUM LEAKAGE DISTANCE; In (mm)	264	(6706)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1750	(7784)
CANTILEVER BREAKING STRENGTH,UNDERHUNG pounds (N)	1750	(7784)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1610
LOW FREQUENCY WET WITHSTAND, kV	590
IMPULSE WITHSTAND, kV	1470

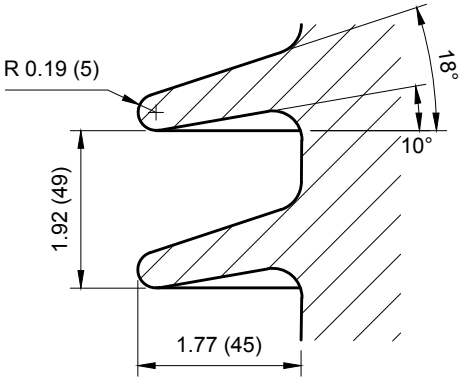
RADIO INFLUENCE VOLTAGE

TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:
Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

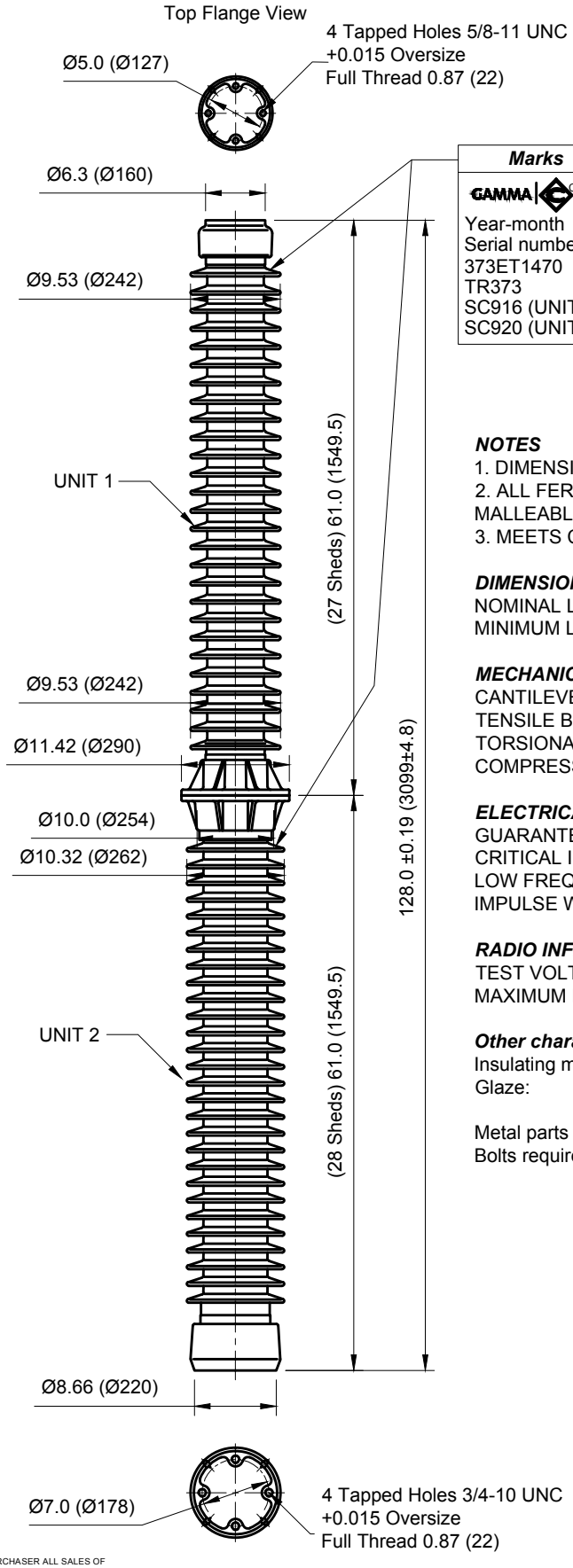
Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Shed Profile (Unit 1,2)



DWG. No.: H21372EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 373	GAMMA CERISOL EUROPE	373ET1470
BIL 1470 kV	in (mm)	TITLE: STATION POST INSULATOR. EXTRA HIGH STRENGTH



Marks

GAMMA CERISOL EUROPE
Year-month
Serial number
373ET1470
TR373
SC916 (UNIT1)
SC920 (UNIT2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SP916PJ	TR373 SC916	234 lb 106 kg	4 holes 5/8-11UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 4x washers
UNIT 2	S2920EJ	TR373 SC920	309 lb 140 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		543 lb 246 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	269	(6833)
MINIMUM LEAKAGE DISTANCE; In (mm)	264	(6706)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1750	(7784)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266800)

ELECTRICAL VALUES

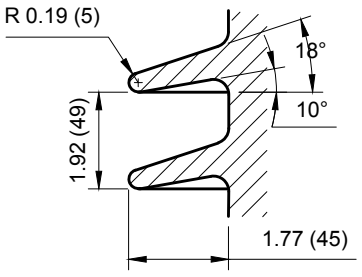
GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1610
LOW FREQUENCY WET WITHSTAND, kV	590
IMPULSE WITHSTAND, kV	1470

RADIO INFLUENCE VOLTAGE

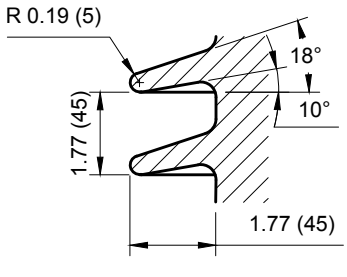
TEST VOLTAGE, RMS TO GROUND, kV	220
MAXIMUM RIV AT 1 MHz, µV	1000

Other characteristics:
Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.



Shed Profile (Unit 1)

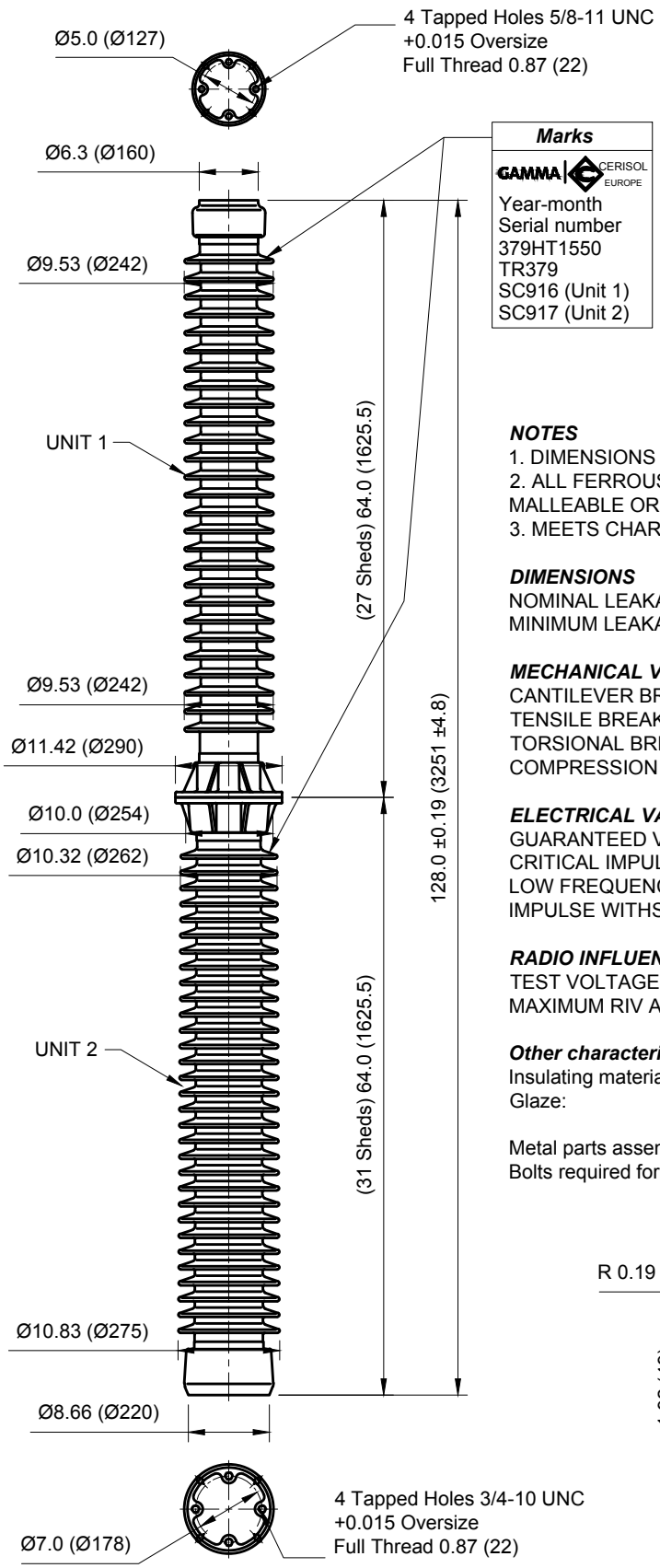


Shed Profile (Unit 2)

DWG. No.: H21373EJ	DWG: TYPE SALES	Date: 2015/07/07	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 379	GAMMA | CERISOL EUROPE	379HT1550
BIL 1550 kV	in (mm)	TITLE: STATION POST INSULATOR. HIGH STRENGTH

Top Flange View



Bottom Flange View

Marks

GAMMA | CERISOL EUROPE
Year-month
Serial number
379HT1550
TR379
SC916 (Unit 1)
SC917 (Unit 2)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	SL916MJ	TR379 SC916	230 lb 104 kg	4 holes 5/8-11UNC 8xØ18xØ254	8xM16 Bolts 8xM16 Nuts 8x Washers
UNIT 2	S2917EJ	TR379 SC917	329 lb 149 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		559 lb 253 kg		

NOTES
1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	284	(7214)
MINIMUM LEAKAGE DISTANCE; In (mm)	280	(7112)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1700	(7562)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

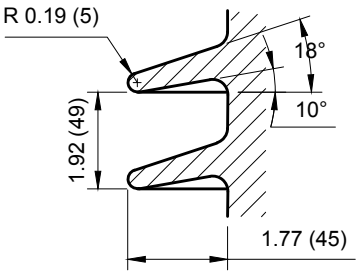
GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	1710
LOW FREQUENCY WET WITHSTAND, kV	620
IMPULSE WITHSTAND, kV	1550

RADIO INFLUENCE VOLTAGE

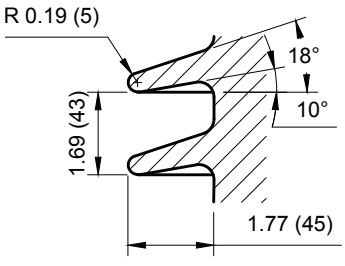
TEST VOLTAGE, RMS TO GROUND, kV	318
MAXIMUM RIV AT 1 MHz, µV	2000

Other characteristics:
Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.



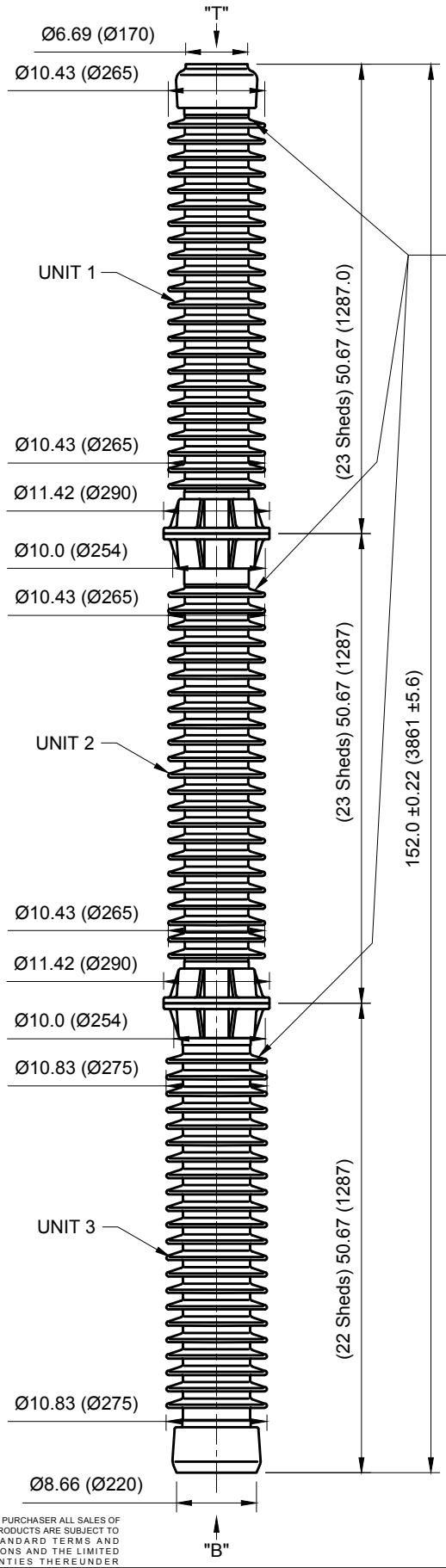
Shed Profile (Unit 1)



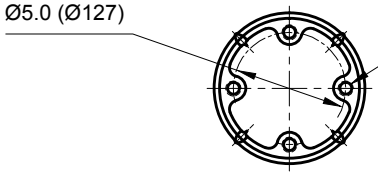
Shed Profile (Unit 2)

DWG. No.: H21379EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

Technical reference number:		PART NUMBER
TR 391	GAMMA CERISOL EUROPE	391ST1800
BIL 1800 kV	in (mm)	TITLE: STATION POST INSULATOR. STANDARD STRENGTH



Top Flange View "T"



Marks

GAMMA CERISOL EUROPE
Year-month
Serial number
391ST1800
TR391
SC6900 (Unit 1,2)
SC6901 (Unit 3)

	Assembly:				
	Unit Part n°	Unit Shed ID	Weight:	Fixation: Top / Bottom	Galvanized Steel:
UNIT 1	S26900EJ	TR391 SC6900	267 lb 121 kg	4 holes 5/8-11UNC 8xØ18xØ254	16xM16 Bolts 16xM16 Nuts 16x Washers
UNIT 2	S36900EJ	TR391 SC6900	274 lb 124 kg	8xØ18xØ254 8xØ18xØ254	
UNIT 3	S26901EJ	TR391 SC6901	291 lb 132 kg	8xØ18xØ254 4 holes 3/4-10UNC	
	Total Weight:		832 lb 377 kg		

NOTES

1. DIMENSIONS ARE INCHES (MILLIMETERS)
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A153, MALLEABLE OR SPHEROIDAL CAST IRON.
3. MEETS CHARACTERISTICS AND TOLERANCES OF ANSI C29.9 / C29.1

DIMENSIONS

NOMINAL LEAKAGE DISTANCE, In (mm)	330	(8382)
MINIMUM LEAKAGE DISTANCE; In (mm)	321.5	(8166)

MECHANICAL VALUES

CANTILEVER BREAKING STRENGTH,UPRIGHT pounds (N)	1400	(6227)
TENSILE BREAKING STRENGTH, pounds (N)	20000	(88960)
TORSIONAL BREAKING STRENGTH, in-pounds (N.m)	40000	(4520)
COMPRESSION BREAKING STRENGTH, pounds (N)	60000	(266880)

ELECTRICAL VALUES

GUARANTEED VOLTAGES:	
CRITICAL IMPULSE FLASHOVER, POS., kV	2000
LOW FREQUENCY WET WITHSTAND, kV	710
IMPULSE WITHSTAND, kV	1800

RADIO INFLUENCE VOLTAGE

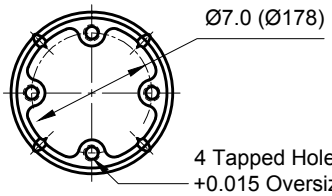
TEST VOLTAGE, RMS TO GROUND, kV	318
MAXIMUM RIV AT 1 MHz, µV	2000

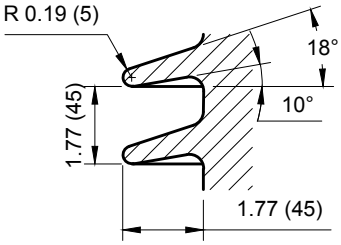
Other characteristics:

Insulating material: Al. Porcelain
Glaze: Light Gray Munsell n° 70

Metal parts assembled with Portland cement.
Bolts required for stack assembly are supplied.

Bottom Flange View "B"





Shed Profile
(Unit 1,2,3)

DWG. No.: H21391EJ	DWG: TYPE SALES	Date: 2015/07/01	DWN: A.MEJÍA A.	APP: C. JARAMILLO

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

Date: March 08, 2008

CERTIFICATE OF TESTING

MATERIAL TESTED: GAMMA STATION POST Insulator. **TR 202**

DESIGN TESTS

1. LOW FREQUENCY WET WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.5 of ANSI C29.1-1982. Failure of any insulator to meet the rated wet withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Low Frequency Wet Withstand, kV	**30**	**30**	**30**	**30**

Result: Satisfactory

2. CRITICAL IMPULSE FLASHOVER, POSITIVE

Three insulators were randomly selected and tested in accordance with section 4.7 of ANSI C29.1-1982. Failure of the average critical – impulse flashover value of the three insulators to equal or exceed 92 percent of the rated critical – impulse flashover value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	92%
Critical Impulse Flashover, Positive, kV	**120,7**	**119,6**	**120,9**	**120,4**	**105**	**96.6**

Result: Satisfactory

3. IMPULSE WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.8 of ANSI C29.1-1982. Failure of any insulator to meet the rated impulse withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Impulse Withstand, kV	**95**	**95**	**95**	**95**

Result: Satisfactory

4. RADIO INFLUENCE VOLTAGE RIV

Three insulators were randomly selected and tested in accordance with section 4.9 of ANSI C29.1-1982. If one or more insulators fail to meet the requirements given in the standard, three additional insulators shall be selected at random and tested. Failure of one or more of these additional insulators shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Rating max
RIV at **5 kV,** to ground (µV)	<2,5µV	<2,5µV	<2,5µV	**50 µV**

Result: Satisfactory

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

5. THERMAL SHOCK TEST

Three insulators were randomly selected and tested for ten complete cycles in accordance with section 5.5 of ANSI C29.1-1982. The temperature of the hot water bath was approximately 150°F (66°C) and the temperature of the cold water was approximately 39°F (4°C). At the end of the tenth cycle the test specimens were checked for electrical soundness. If one insulator fails, three additional insulators shall be selected randomly and tested. Failure of more than one insulator from the first set of samples, or from the first and second set of samples combined shall constitute failure to meet the requirements of this standard.

Three insulators were thermal shock tested in accordance to ANSI Standard, section 5.5.
All units passed this test.

Result: Satisfactory

6. COMPRESSION STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.4 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement where applicable, or failure of any one insulator unit to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Compression Strength, pounds (*)	**225.496**	**226.202**	**224.941**	**225.546**	**10.000**	**8500**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

7. TORSIONAL STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.2 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Torsional Strength, inches pounds	**20.116**	**21.586**	**26.118**	**22.607**	**6.000**	**5100**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

corona

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

QUALITY CONFORMANCE TESTS

1. VISUAL AND DIMENSIONAL TEST

Three insulators were randomly selected and checked according to section 4.2 of the standard and met the requirements. Their dimensions were verified against the manufacturing drawing.
Failure of more than one of these insulators to conform to the dimensions on the drawing shall constitute failure of the lot to meet the requirements of the standard.

All the samples meet the conditions and dimensions.

Result: Satisfactory

2. POROSITY TEST

Ten samples of porcelain taken from the same firing cycle as these posts were subjected to the porosity test. No porosity was observed. The test was performed in accordance with ANSI C29.9-1983, paragraph 7.3.2.

Dyer penetration:
NEGATIVE: X POSITIVE:

Result: Satisfactory

3. GALVANIZING TEST

A galvanizing thickness test was performed on three hardware samples. The galvanizing thickness measured, equaled or exceeded the values given in the table shown in paragraph 7.3.3 of ANSI C29.9-1983.

Result: Satisfactory

4. CANTILEVER STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.1 of ANSI C29.1-1982. The units were tested individually. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Cantilever Strength, pounds	**5.985**	**5.806**	**5.995**	**5.929**	**2000**	**1700**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

5. TENSILE STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.3 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Tensile Strength, pounds (*)	**30.007**	**27.028**	**27.912**	**28.316**	**7000**	**5950**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

FRANK ESCOBAR OBANDO
PRODUCT ENGINEER.

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

Date: March 08, 2008

CERTIFICATE OF TESTING

MATERIAL TESTED: GAMMA STATION POST Insulator. **TR 205**

DESIGN TESTS

1. LOW FREQUENCY WET WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.5 of ANSI C29.1-1982. Failure of any insulator to meet the rated wet withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Low Frequency Wet Withstand, kV	**45**	**45**	**45**	**45**

Result: Satisfactory

2. CRITICAL IMPULSE FLASHOVER, POSITIVE

Three insulators were randomly selected and tested in accordance with section 4.7 of ANSI C29.1-1982. Failure of the average critical – impulse flashover value of the three insulators to equal or exceed 92 percent of the rated critical – impulse flashover value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	92%
Critical Impulse Flashover, Positive, kV	**150,7**	**142,1**	**145,1**	**146,0**	**125**	**115**

Result: Satisfactory

3. IMPULSE WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.8 of ANSI C29.1-1982. Failure of any insulator to meet the rated impulse withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Impulse Withstand, kV	**110**	**110**	**110**	**110**

Result: Satisfactory

4. RADIO INFLUENCE VOLTAGE RIV

Three insulators were randomly selected and tested in accordance with section 4.9 of ANSI C29.1-1982. If one or more insulators fail to meet the requirements given in the standard, three additional insulators shall be selected at random and tested. Failure of one or more of these additional insulators shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Rating
RIV at **10 kV,** to ground (µV)	**<2,5µV**	**<2,5µV**	**<2,5µV**	**50 µV max**

Result: Satisfactory

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
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5. THERMAL SHOCK TEST

Three insulators were randomly selected and tested for ten complete cycles in accordance with section 5.5 of ANSI C29.1-1982. The temperature of the hot water bath was approximately 150°F (66°C) and the temperature of the cold water was approximately 39°F (4°C). At the end of the tenth cycle the test specimens were checked for electrical soundness. If one insulator fails, three additional insulators shall be selected randomly and tested. Failure of more than one insulator from the first set of samples, or from the first and second set of samples combined shall constitute failure to meet the requirements of this standard.

Three insulators were thermal shock tested in accordance to ANSI Standard, section 5.5. All units passed this test.

Result: Satisfactory

6. COMPRESSION STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.4 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement where applicable, or failure of any one insulator unit to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Compression Strength, pounds (*)	**225.406**	**226.056**	**224.770**	**225.411**	**10.000**	**8500**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

7. TORSIONAL STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.2 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Torsional Strength, inches pounds	**19.418**	**20.716**	**21.529**	**20.554**	**7.000**	**5950**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

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Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

QUALITY CONFORMANCE TESTS

1. VISUAL AND DIMENSIONAL TEST

Three insulators were randomly selected and checked according to section 4.2 of the standard and met the requirements. Their dimensions were verified against the manufacturing drawing.
Failure of more than one of these insulators to conform to the dimensions on the drawing shall constitute failure of the lot to meet the requirements of the standard.

All the samples meet the conditions and dimensions.

Result: Satisfactory

2. POROSITY TEST

Ten samples of porcelain taken from the same firing cycle as these posts were subjected to a porosity test. No porosity was observed. The test was performed in accordance with ANSI C29.9-1983, paragraph 7.3.2.

Dyer penetration:
NEGATIVE: X POSITIVE:

Result: Satisfactory

3. GALVANIZING TEST

A galvanizing thickness test was performed on three hardware samples. The galvanizing thickness measured, equaled or exceeded the values given in the table shown in paragraph 7.3.3 of ANSI C29.9-1983.

Result: Satisfactory

4. CANTILEVER STRENGTH TEST

Three insulators were randomly selected and tested according to section 5.1.4.1 of ANSI C29.1-1982. The units were tested individually. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Cantilever Strength, pounds	**4.239**	**4.781**	**4.162**	**4.394**	**2000**	**1700**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

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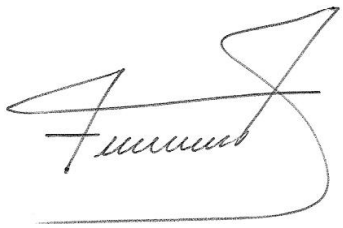
5. TENSILE STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.3 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Tensile Strength, pounds (*)	**23.692**	**25.763**	**26.058**	**25.171**	**8500**	**7225**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory



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AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

Date: March 08, 2008

CERTIFICATE OF TESTING

MATERIAL TESTED: GAMMA STATION POST Insulator **TR 208**

DESIGN TESTS

1. LOW FREQUENCY WET WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.5 of ANSI C29.1-1982. Failure of any insulator to meet the rated wet withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Low Frequency Wet Withstand, kV	**60**	**60**	**60**	**60**

Result: Satisfactory

2. CRITICAL IMPULSE FLASHOVER, POSITIVE

Three insulators were randomly selected and tested in accordance with section 4.7 of ANSI C29.1-1982. Failure of the average critical – impulse flashover value of the three insulators to equal or exceed 92 percent of the rated critical – impulse flashover value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	92%
Critical Impulse Flashover, Positive, kV	**171,9**	**174,4**	**175,5**	**173,9**	**170**	**156.4**

Result: Satisfactory

3. IMPULSE WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.8 of ANSI C29.1-1982. Failure of any insulator to meet the rated impulse withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Impulse Withstand, kV	**151**	**150**	**151**	**150**

Result: Satisfactory

4. RADIO INFLUENCE VOLTAGE RIV

Three insulators were randomly selected and tested in accordance with section 4.9 of ANSI C29.1-1982. If one or more insulators fail to meet the requirements given in the standard, three additional insulators shall be selected at random and tested. Failure of one or more of these additional insulators shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Rating
RIV at **15 kV,** to ground (µV)	**<2,5µV**	**<2,5µV**	**<2,5µV**	**100 µV max**

Result: Satisfactory

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5. THERMAL SHOCK TEST

Three insulators were randomly selected and tested for ten complete cycles in accordance with section 5.5 of ANSI C29.1-1982. The temperature of the hot water bath was approximately 150°F (66°C) and the temperature of the cold water was approximately 39°F (4°C). At the end of the tenth cycle the test specimens were checked for electrical soundness. If one insulator fails, three additional insulators shall be selected randomly and tested. Failure of more than one insulator from the first set of samples, or from the first and second set of samples combined shall constitute failure to meet the requirements of this standard.

Three insulators were thermal shock tested in accordance to ANSI Standard, section 5.5.
All units passed this test.

Result: Satisfactory

6. COMPRESSION STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.4 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement where applicable, or failure of any one insulator unit to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Compression Strength, pounds (*)	**225.480**	**225.570**	**225.795**	**225.615**	**10000**	**8500**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

7. TORSIONAL STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.2 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Torsional Strength, inches pounds	**21.232**	**24.023**	**25.311**	**23.522**	**8000**	**6800**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

corona

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Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

QUALITY CONFORMANCE TESTS

1. VISUAL AND DIMENSIONAL TEST

Three insulators were randomly selected and checked according to section 4.2 of the standard and met the requirements. Their dimensions were checked against the dimension of manufacturing drawing Failure of more than one of these insulators to conform to the dimensions of the drawing shall constitute failure of the lot to meet the requirements of the standard.

All the samples meet the conditions and dimensions. Result satisfactory.

Result: Satisfactory

2. POROSITY TEST

Ten samples of porcelain taken from the same firing cycle as these posts were subjected to a porosity test. No porosity was observed. The test was performed in accordance with ANSI C29.9-1983, paragraph 7.3.2.

Dyer penetration:
NEGATIVE: X POSITIVE:

Result: Satisfactory

3. GALVANIZING TEST

A galvanizing thickness test was performed on three hardware samples. The galvanizing thickness measured, equaled or exceeded the values given in the table shown in paragraph 7.3.3 of ANSI C29.9-1983.

Result: Satisfactory

4. CANTILEVER STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.1 of ANSI C29.1-1982. The units were tested individually. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Cantilever Strength, pounds	3.226	2.641	2.689	2.852	2000	1700

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

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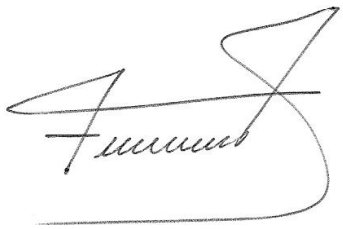
5. TENSILE STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.3 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Tensile Strength, pounds (*)	18.985	22.672	26.324	22.660	10000	8500

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory



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AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

Date: March 08, 2008

CERTIFICATE OF TESTING

MATERIAL TESTED: GAMMA STATION POST Insulator. **TR 210**

DESIGN TESTS

1. LOW FREQUENCY WET WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.5 of ANSI C29.1-1982. Failure of any insulator to meet the rated wet withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Low Frequency Wet Withstand, kV	**80**	**80**	**80**	**80**

Result: Satisfactory

2. CRITICAL IMPULSE FLASHOVER, POSITIVE

Three insulators were randomly selected and tested in accordance with section 4.7 of ANSI C29.1-1982. Failure of the average critical – impulse flashover value of the three insulators to equal or exceed 92 percent of the rated critical – impulse flashover value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	92%
Critical Impulse Flashover, Positive, kV	**208,1**	**211,7**	**212**	**210,6**	**225**	**207**

Result: Satisfactory

3. IMPULSE WITHSTAND

Three insulators were randomly selected and tested in accordance with section 4.8 of ANSI C29.1-1982. Failure of any insulator to meet the rated impulse withstand value, as given in the applicable table, shall constitute failure to meet the requirements of the standard.

	Unit 1	Unit 2	Unit 3	Rating
Impulse Withstand, kV	**201,21**	**203,53**	**200,09**	**200**

Result: Satisfactory

4. RADIO INFLUENCE VOLTAGE RIV

Three insulators were randomly selected and tested in accordance with section 4.9 of ANSI C29.1-1982. If one or more insulators fail to meet the requirements given in the standard, three additional insulators shall be selected at random and tested. Failure of one or more of these additional insulators shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Rating
RIV at **22 kV,** to ground (µV)	**< 2,5µV**	**< 2,5µV**	**< 2,5µV**	**100 µV max**

Result: Satisfactory

AISLADORES CORONA
Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
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5. THERMAL SHOCK TEST

Three insulators were randomly selected and tested for ten complete cycles in accordance with section 5.5 of ANSI C29.1-1982. The temperature of the hot water bath was approximately 150°F (66°C) and the temperature of the cold water was approximately 39°F (4°C). At the end of the tenth cycle the test specimens were checked for electrical soundness. If one insulator fails, three additional insulators shall be selected randomly and tested. Failure of more than one insulator from the first set of samples, or from the first and second set of samples combined shall constitute failure to meet the requirements of this standard.

Three insulators were thermal shock tested in accordance to ANSI Standard, section 5.5.
All units passed this test.

Result: Satisfactory

6. COMPRESSION STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.4 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement where applicable, or failure of any one insulator unit to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Compression Strength, pounds (*)	**140.757**	**131.166**	**215.206**	**162.376**	**15000**	**12750**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

7. TORSIONAL STRENGTH

Three insulators were randomly selected and tested in accordance with section 5.1.4.2 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Torsional Strength, inches pounds	**25.866**	**25.799**	**25.773**	**25.813**	**10000**	**8500**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

corona

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Carrera 49 No. 67 sur - 680
Sabaneta - Colombia
Nit: 890.900.121-4
Conmutador (574) 305 80 00

QUALITY CONFORMANCE TESTS

1. VISUAL AND DIMENSIONAL TEST

Three insulators were randomly selected and checked according to section 4.2 of the standard and met the requirements. Their dimensions were checked against the dimension of manufacturing drawing Failure of more than one of these insulators to conform to the dimensions of the drawing shall constitute failure of the lot to meet the requirements of the standard.

All the samples meet the conditions and dimensions. Result satisfactory.

Result: Satisfactory

2. POROSITY TEST

Ten samples of porcelain taken from the same firing cycle as these posts were subjected to a porosity test. No porosity was observed. The test was performed in accordance with ANSI C29.9-1983, paragraph 7.3.2.

Dyer penetration:
NEGATIVE: X POSITIVE:

Result: Satisfactory

3. GALVANIZING TEST

A galvanizing thickness test was performed on three hardware samples. The galvanizing thickness measured, equaled or exceeded the values given in the table shown in paragraph 7.3.3 of ANSI C29.9-1983.

Result: Satisfactory

4. CANTILEVER STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.1 of ANSI C29.1-1982. The units were tested individually. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Cantilever Strength, pounds	**3.628**	**3.791**	**3.693**	**3.704**	**2000**	**1700**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory

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Nit: 890.900.121-4
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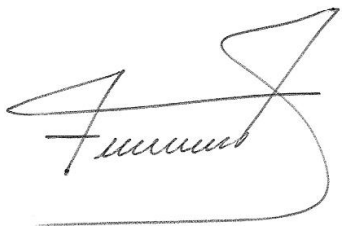
5. TENSILE STRENGTH TEST

Three insulators were randomly selected and tested in accordance with section 5.1.4.3 of ANSI C29.1-1982. Failure of the average strength of the three insulators to meet the strength requirements given in the tables or to meet the specified higher strength requirement, where applicable, or failure of any insulator to equal 85% of that strength requirement shall constitute failure to meet the requirements of this standard.

	Unit 1	Unit 2	Unit 3	Average	Rating	85%
Tensile Strength, pounds (*)	**40.000**	**40.000**	**40.000**	**40.000**	**12000**	**10200**

NOTE: (*) Load released with no visible damage to the unit

Result: Satisfactory



FRANK ESCOBAR OBANDO
PRODUCT ENGINEER.

GAMMA Insulators

Design Test Certification

Material Tested **GAMMA Catalog Number 8435**

TEST OBJECT: Station Post Insulator

TYPE SPECIFICATION: TR 214

TEST STANDARDS: ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
Electrical Tests		
2	7.2.1	Low-frequency Wet Withstand Voltage
3	7.2.2 & 7.2.3	Critical Impulse Flashover Positive & Impulse Withstand Voltage
5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
	Quality Conformance Tests, Section 7.3	
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA Catalog 8435
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

	Sample No. 1	Sample No. 2	Sample No. 3
b (in Hg) **t (°F)**	29.42 65.84	29.42 65.84	29.42 65.84
r.i. (mm/min) **R_W (Ωm)**	5.0 185.0	5.0 185.0	5.0 185.0
V_{LW} (kV) T **(s)** **result**	**100** 10 no flashover occurred	**100** 10 no flashover occurred	**100** 10 no flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 100 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. **Post type insulator TR-214, Catalog No. 8435 passed low-frequency wet withstand voltage test according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	+			-		
Test Sample No.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**250**	**250**	**250**	**250**	**250**	**250**
Impulses Flashovers	3 0	3 0	3 0	3 0	3 0	3 0
b (in Hg) **t (°F)**	29.48 67.6	29.48 67.6	29.48 67.6	29.48 67.6	29.48 67.6	29.48 67.6
K_h **K_d**	1.0029 1.0764	1.0029 1.0764	1.0029 1.0764	1.0029 1.0663	1.0029 1.0663	1.0029 1.0663
$V_{CRS\ LI}$ (kV)	277	277	276	468	452	482
$V_{CRSA\ LI}$ (kV)	**277**			**467**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 250 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. **Post type insulator TR-214, Catalog No. 8435 passed impulse withstand voltage test according to ANSI C29.9, cl. 7.2.3.**

The rated critical-impulse flashover voltage 280 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 258 kV. All test samples met the requirements. **Post type insulator TR-214, Catalog No. 843 passed critical-impulse flashover voltage test according to ANSI C29.9, cl. 7.2.2.**

GAMMA Catalog 8435
Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.
The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

	Sample No. 1	**Sample No. 2**	**Sample No. 3**
b (in Hg) **t (°F)**	29,48 63,5	29,48 63,5	29,48 63,5
V_T (kV)	**RIV (μV)**	**RIV (μV)**	**RIV (μV)**
33	4	4	4
30	**4**	**4**	**4**
27	4	4	4
0	4	4	4
Rated value: max. 200 μV at 30 kV/1,0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 30 kV (1 MHz) are less than 200 μV specified by ANSI C29.9, Table 2. All test samples met the requirements. **Post type insulator TR-214, Catalog No. 8435 passed radio-influence voltage test according to ANSI C29.9, cl. 7.2.4.**

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 °F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F / 10 min and 39 °F/ 10 min)	**Low-frequency Momentary Flashover Voltage Test**	**Flashover voltage (kV)**	**Result**
Test Sample No. 1	No failure	No failure	173	Passed
Test Sample No. 2	No failure	No failure	178	Passed
Test Sample No. 3	No failure	No failure	179	Passed

No failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements.
Post type insulator TR-214, Catalog No. 8435 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 14,994.76 lbs. (66.70 kN). Smooth increase in load 450 - 900 lbs. /s. (2 - 4 kN/s), smooth load up to failure, visual inspection

Compression Strength Test Results

Sample No.	Maximum failure load lbs. (kN)	Failure Mode	Result (MFL)
7	(3012)	Sheds	Passed
8	(2035)	Sheds	Passed
9	(3012)	Ceramic core	Passed
Average	(2686)		

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 11,948.51 lb.-in. (1.35 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up to failure of screws

Torsional Strength Test Results

Sample No.	Maximum reached torsional moment lbs. (kNm)	Failure Mode	Result (MFL)
10	>75,231.34 (8.5)	Screws failed. Insulator did not fail. Test stopped by operator.	Passed
11	> 77,001.49 (8.7)	Screws failed. Insulator did not fail. Test stopped by operator.	Passed
12	> 57,529.85 (6.5)	Insulator did not fail. Test stopped by operator	Passed

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 2,023.28 lbs. (9 kN), Increase in load 6.74 – 13.49 lbs. /s (0.03 - 0.06 kN/s), smoothly to failure

Cantilever Strength Test Results

Sample No.	Maximum failing load lbs. (kN)	Failure Mode	Result (MFL)
1	3,214.77 (14.30)	Failed at bottom part of ceramic core	passed
2	2,203.13 (9.80)	Failed at bottom part of ceramic core	passed
3	3,012.44 (13.4)	Failed at bottom part of ceramic core	passed
Average	2,810.11 (12.5)		

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 13,983.11 lbs. (62.2 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up to failure, visual inspection

Tensile Strength Test Results

Sample No.	Maximum failure load [kN]	Way of failure	Result (MFL)
4	20,839.79 (92.7)	Ceramic core inside of metal cap	Passed
5	36,081.84 (160.5)	Ceramic core inside of metal cap	Passed
6	28,404.61 (126.35)	Ceramic core inside of metal cap	Passed
Average	28,438.33 (126.5)		

Tests performed at EGU HV Laboratory a. s., Test No. 10210/A/15, and The Klockner Institute, Report No. 129/15/AL. All test results contained in this document are held on file under drawing number reference 84351011.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation

GAMMA Insulators

Design Test Certification

Material Tested **GAMMA Catalog Number 8436**

TEST OBJECT: Station Post Insulator

TYPE SPECIFICATION: TR 216

TEST STANDARDS: ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
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2	7.2.1	Low-frequency Wet Withstand Voltage
3	7.2.2 & 7.2.3	Critical Impulse Flashover Positive & Impulse Withstand Voltage
5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
Quality Conformance Tests, Section 7.3		
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA Catalog 8436
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

	Sample No. 1	Sample No. 2	Sample No. 3
b (in Hg) **t (°F)**	29.42 67.1	29.42 67.1	29.42 67.1
r.i. (mm/min) **R_W (Ωm)**	5.0 185.0	5.0 185.0	5.0 185.0
V_{LW} (kV) **T (s)** **Result**	**145** 10 no flashover occurred	**145** 10 no flashover occurred	**145** 10 no flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 145 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. **Post type insulator TR-216, Catalog No. 8436 passed low-frequency wet withstand voltage test according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	+			-		
Test Sample No.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**350**	**350**	**350**	**350**	**350**	**350**
Impulses Flashovers	3 0	3 0	3 0	3 0	3 0	3 0
b (in Hg) **t (°F)**	29.48 64.6	29.48 64.6	29.48 64.6	29.48 64.6	29.48 64.6	29.48 64.6
K_h **K_d**	1.0088 1.0823	1.0088 1.0823	1.0088 1.0823	1.0088 1.0714	1.0088 1.0714	1.0088 1.0714
$V_{CRS\ LI}$ (kV)	383	386	381	630	640	617
$V_{CRSA\ LI}$ (kV)	**383**			**629**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 350 kV specified by ANSI C29.9, Table 2, All test samples met the requirements. **Post type insulator TR-216, Catalog No. 8436 passed impulse withstand voltage test according to ANSI C29.9, cl. 7.2.3.**

The rated critical-impulse flashover voltage 390 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 359 kV. All test samples met the requirements. **Post type insulator TR-216, Catalog No. 8436 passed critical-impulse flashover voltage test according to ANSI C29.9, cl. 7.2.2.**

GAMMA Catalog 8436
Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.
The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

	Sample No. 1	Sample No. 2	Sample No. 3
b (in Hg) t (°F)	29.48 63.5	29.48 63.5	29.48 63.5
V_T (kV)	RIV (μV)	RIV (μV)	RIV (μV)
48	4	4	4
44	4	4	4
40	4	4	4
36	4	4	4
0	4	4	4
Rated value: max. 200 μV at 30 kV/1,0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 44 kV (1 MHz) are less than 200 μV specified by ANSI C29.9, Table 2. All test samples met the requirements. **Post type insulator TR-216, Catalog No. 8436 passed radio-influence voltage test according to ANSI C29.9, cl. 7.2.4.**

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F / 10 min and 39 °F/ 10 min)	Low-frequency Momentary Flashover Voltage Test	Flashover voltage (kV)	Result
Test Sample No. 1	No failure	No failure	242	Passed
Test Sample No. 2	No failure	No failure	246	Passed
Test Sample No. 3	No failure	No failure	241	Passed

No failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements.
Post type insulator TR-216, Catalog No. 8436 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.

GAMMA Catalog 8436
Design Test Certification

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 24,998.75 lbs. (111.2 kN). Smooth increase in load 450 - 900 lbs./s. (2 - 4 kN/s), Smooth load up to failure, visual inspection

Compression Strength Test Results

Sample No.	Maximum failure load lbs. (kN)	Failure Mode	Result (MFL)
7	(3754)	Ceramic core	Passed
8	(3628)	Ceramic core	Passed
9	(3472)	Ceramic core	Passed
Average	(3618)		

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 15,002 lb.-in. (1.695 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up until 57,530 lb.-in. (6.5 kNm) – The limit of screws used, test stopped by operator, visual inspection.

Torsional Strength Test Results

Sample No.	Maximum Reached Torsional Moment lbs.-in. (kNm)	Failure Mode	Result (MFL)
10	>57,530 (6.5)	Insulator did not fail. Test stopped by operator.	Passed
11	>57,530 (6.5)	Insulator did not fail. Test stopped by operator	Passed
12	>57,530 (6.5)	Insulator did not fail. Test stopped by operator	Passed

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 1,506.22 lbs. (6. kN), Increase in load 6.74 – 13.49 lbs. /s (0.03 - 0.06 kN/s), smoothly until failure

Cantilever Strength Test Results

Sample No.	Maximum failing load lbs. (kN]	Failure Mode	Result (MFL)
1	2,855.07 (12.7)	Failed at bottom part of ceramic core	Passed
2	1775.99 (7.9)	Failed at bottom part of ceramic core	Passed
3	2472.90 (11.0)	Failed at bottom part of ceramic core	Passed
Average	2360.50 (10.5)		

GAMMA Catalog 8436
Design Test Certification

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 16,006.40 lbs. (71.2 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up to Failure, visual inspection.

Tensile Strength Test Results

Sample No.	Maximum failure load lbs. (kN)	Failure Mode	Result (MFL)
4	25,628.22 (114.0)	Ceramic core inside of metal cap	Passed
5	23,649.90 (105.2)	Ceramic core inside of metal cap	Passed
6	24,661.54 (109.7)	Ceramic core inside of metal cap	Passed
Average	24,639.06 (109.6)		

Tests performed at EGU HV Laboratory a. s., Test No.10201/B/15, and The Klokner Institute, Report No. 128/15/AL. All test results contained in this document are held on file under drawing number reference 84361011.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation

Design Test Certification

Material Tested	**GAMMA-CERISOL Catalog Number 288SU0650**
TEST OBJECT:	Station Post Insulator
TYPE SPECIFICATION:	TR 288
TEST STANDARDS:	ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
Electrical Tests		
2	7.2.1	Low-frequency Wet Withstand Voltage
3	7.2.2 & 7.2.3	Critical Impulse Flashover Positive & Impulse Withstand Voltage
5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
	Quality Conformance Tests, Section 7.3	
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA-CERISOL Catalog 288SU0650
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.
The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

Station post insulator			
	Sample No. 1	**Sample No.2**	**Sample No.3**
b (in Hg) **t (°F)**	28.88 60.6	28.88 60.6	28.88 60.6
r.i. (mm/min) **R_w (Ωm)**	5.0 200.0	5.0 200.0	5.0 200.0
V_{LW} (kV) **T (s)** **result**	**275** 10 No flashover occurred	**275** 10 No flashover occurred	**275** 10 No flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 275 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 288, **Catalog No. 288SU0650 passed low-frequency wet withstand voltage tests according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.
The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	**+**			**-**		
Test sample No.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**650**	**650**	**650**	**650**	**650**	**650**
Impulses Flashovers	3 0	3 0	3 0	3 0	3 0	3 0
b (in Hg) **t (°F)**	28.85 60.6	28.85 60.6	28.76 61.7	28.85 60.6	28.85 60.6	28.76 61.7
K_h **K_d**	1.066 0.995	1.066 0.995	1.061 0.990	1.058 0.995	1.058 0.995	1.054 0.990
$V_{CRS\ LI}$ (kV)	701	711	706	863	846	829
$V_{CRSA\ LI}$ (kV)	**706**			**846**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 650 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 288, **Catalog No. 288SU0650 passed impulse withstand voltage tests according to ANSI C29.9, cl. 7.2.3.**
The rated critical-impulse flashover voltage 710 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 653 kV. All test samples met

the requirements. Station post insulator TR 288, **Catalog No. 288SU0650 passed critical impulse flashover voltage tests according to ANSI C29.9, cl. 7.2.2.**

GAMMA-CERISOL Catalog 288SU0650

Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.

The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

Station post insulator			
	Sample No.1	**Sample No.2**	**Sample No. 3**
b (in Hg)	29.03	29.03	29.03
t (°F)	59.5	59.7	59.7
V_T (kV)	**RIV (µV)**	**RIV (µV)**	**RIV (µV)**
97	6	6	6
88	**6**	**6**	**6**
79	6	6	6
70	6	6	6
61	6	6	6
0	6	6	6
Rated value: ma. 200 µV at 88 kV/1.0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 88kV (1MHz) are less than 200 µV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 288, **Catalog No. 288SU0650 passed radio-influence voltage tests according to ANSI C29.9, cl. 7.2.4.**

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 °F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F/ 10 min and 39 °F/ 10 min)	Low-frequency Momentary Flashover Voltage Test	Flashover voltage (kV)	Result
Test sample #1	No failure	No failure	410	Passed
Test sample #2	No failure	No failure	404	Passed
Test sample #3	No failure	No failure	413	Passed

No Failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements. Station post insulator TR 288, **Catalog No. 288SU0650 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.**

GAMMA-CERISOL Catalog 288SU0650
Design Test Certification

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 60,000 lbs. (266.880 kN). Smooth increase in load 450 - 900 lbs. /s. (2 - 4 kN/s), Smooth load up until 67,442.68 lbs. (300 kN), 3 sec hold on this level and unloading, visual inspection.

Compression Strength Test Results

Sample No.	Load 67,442.68 lbs. (300 kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 40,000 lb.-in. (4.52 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up until 44,253.73 lb.-in. (5 kNm), 3 sec hold on this level and unloading, visual inspection.

Torsional Strength Test Results

Sample No.	Torsional moment 44,253.73 lb.-in. (5 kNm) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 1,400 lbs. (6.227 kN), Increase in load 6.74 – 13.49 lbs. /s (0.03 - 0.06 kN/s), smoothly until failure

Cantilever Strength Test Results

Sample No.	Maximum failing load lbs. (kN)	Way of failure	Result (MFL)
1	2,592.05 lbs. (11.53kN)	Failed at bottom part of ceramic core	**Passed**
2	2,189.64 lbs. (9.74kN)	Failed at bottom part of ceramic core	**Passed**
3	2,297.55 lbs. (10.22kN)	Failed at bottom part of ceramic core	**Passed**
Average	2,358.25 lbs. (10.49kN)		

GAMMA-CERISOL Catalog 288SU0650
Design Test Certification

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 20,000 lbs. (88.96 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up until 21,356.85.07 lbs. (95 kN), 3 sec hold on this level and unloading, visual inspection.

Tensile Strength Test Results

Sample No.	Load 21,356.07 lbs. (95 kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

Tests performed at EGU HV Laboratory a. s., Test No.10060/B/14, and The Klokner Institute, Report No. 57/14/AL.
All test results contained in this document are held on file under drawing number reference H21288EJ.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation

Design Test Certification

Material Tested	**GAMMA-CERISOL Catalog Number 308HU0900**
TEST OBJECT:	Station Post Insulator
TYPE SPECIFICATION:	TR 308
TEST STANDARDS:	ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
Electrical Tests		
2	7.2.1	Low-frequency Wet Withstand Voltage
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5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
	Quality Conformance Tests, Section 7.3	
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA-CERISOL Catalog 308HU0900
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.
The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

	Station post insulator		
	Sample No. 1	**Sample No.2**	**Sample No.3**
b (in Hg)	28.79	28.79	28.79
t (°F)	60.6	60.6	60.6
r.i. (mm/min)	5.0	5.0	5.0
R_w (Ωm)	200.0	200.0	200.0
V_{LW} (kV)	**385**	**385**	**385**
T (s)	10	10	10
result	No flashover occurred	No flashover occurred	No flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 385 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 308, **Catalog No. 308HU0900 passed low-frequency wet withstand voltage tests according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.
The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	**+**			**-**		
Test Sample No.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**1010**	**1010**	**1010**	**1010**	**1010**	**1010**
Impulses	3	3	3	3	3	3
Flashovers	0	0	0	0	0	0
b (in Hg)	28.79	28.79	28.79	28.79	28.79	28.79
t (°F)	61.0	61.0	61.0	61.0	61.0	61.0
K_h	1.064	1.064	1.064	1.056	1.056	1.056
K_d	0.992	0.992	0.992	0.992	0.992	0.992
$V_{CRS\ LI}$ (kV)	1112	1105	1106	1277	1277	1299
$V_{CRSA\ LI}$ (kV)	**1108**			**1284**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 1010 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 308, **Catalog No. 308HU0900 passed impulse withstand voltage tests according to ANSI C29.9, cl. 7.2.3.**
The rated critical-impulse flashover voltage 1010 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 929 kV. All test samples met

the requirements. Station post insulator TR 308, **Catalog No. 308HU0900 passed critical impulse flashover voltage tests according to ANSI C29.9, cl. 7.2.2.**

GAMMA-CERISOL Catalog 308HU0900
Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.
The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

Station post insulator			
	Sample No.1	**Sample No.2**	**Sample No. 3**
b (in Hg)	29.00	29.00	29.00
t (°F)	60.3	60.3	60.4
V_T (kV)	**RIV (µV)**	**RIV (µV)**	**RIV (µV)**
161	141	63	100
146	**45**	**32**	**50**
131	10	20	14
116	6	11	9
101	6	7	6
86	6	6	6
71	6	6	6
0	6	6	6
Rated value: ma. 500 µV at 146 kV/1.0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 146kV (1MHz) are less than 500 µV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 308, **Catalog No. 308HU0900 passed radio-influence voltage tests according to ANSI C29.9, cl. 7.2.4.**

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 °F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F/ 10 min, and 39 °F/ 10 min)	Low-frequency Momentary Flashover Voltage Test	Flashover voltage (kV)	Result
Test sample #1	No failure	No failure	596	**Passed**
Test sample #2	No failure	No failure	585	**Passed**
Test sample #3	No failure	No failure	591	**Passed**

No Failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements. Station post insulator TR 308, **Catalog No. 308HU0900 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.**

GAMMA-CERISOL Catalog 308HU0900
Design Test Certification

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 75,000 lbs. (333.6 kN). Smooth increase in load 450 - 900 lbs. /s. (2 - 4 kN/s), Smooth load up until 89,923 lbs. (400 kN), 3 sec hold on this level and unloading, visual inspection.

Compression Strength Test Results

Sample No.	Load 89,923 lbs. (400kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 90,000 lb.-in. **(**10.17 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up until 92,932.83 lb.-in. (10.5 kNm), 3 sec hold on this level and unloading, visual inspection.

Torsional Strength Test Results

Sample No.	Torsional moment 92,932.83 lb.-in. (10.5 kNm) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 1,450 lbs. (6.45 kN)**,** Increase in load 6.74 – 13.49 lbs. /s (0.03 - 0.06 kN/s), smoothly until failure

Cantilever Strength Test Results

Sample No.	Maximum failing load, lbs. (kN)	Way of failure	Result (MFL)
1	1,978.32 (8.8)	Failed at bottom part of ceramic core	**Passed**
2	2,176.15 (9.68)	Failed at bottom part of ceramic core	**Passed**
3	2,000.80 (8.9)	Failed at bottom part of ceramic core	**Passed**
Average	2,050.26 (9.12)		

GAMMA-CERISOL Catalog 308HU0900
Design Test Certification

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 25,000 lbs. (111.2 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up until 26,977.07 lbs. (120 kN), 3 sec hold on this level and unloading, visual inspection.

Tensile Strength Test Results

Sample No.	Load 26,977.07 lbs. (120 kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

Tests performed at EGU HV Laboratory a. s., Test No.10060/C/14, and The Klokner Institute, Report No. 56/14/AL. All test results contained in this document are held on file under drawing number reference H21308EJ.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation

Design Test Certification

Material Tested	**GAMMA-CERISOL Catalog Number 369ET1300**
TEST OBJECT:	Station Post Insulator
TYPE SPECIFICATION:	TR 369
TEST STANDARDS:	ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
Electrical Tests		
2	7.2.1	Low-frequency Wet Withstand Voltage
3	7.2.2 & 7.2.3	Critical Impulse Flashover Positive & Impulse Withstand Voltage
5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
	Quality Conformance Tests, Section 7.3	
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA-CERISOL Catalog 369ET1300
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

Station post insulator			
	Sample No. 1	**Sample No.2**	**Sample No.3**
b (in Hg)	28.82	28.82	28.82
t (°F)	59.4	59.4	59.4
r.i. (mm/min)	4.9	4.9	4.9
R_w (Ωm)	200.0	200.0	200.0
V_{LW} (kV)	**525**	**525**	**525**
T (s)	10	10	10
result	No flashover occurred	No flashover occurred	No flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 525 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 369, **Catalog No. 369ET1300 passed low-frequency wet withstand voltage tests according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	**+**			**-**		
Test sample no.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**1410**	**1410**	**1410**	**1410**	**1410**	**1410**
Impulses	3	3	3	3	3	3
Flashovers	0	0	0	0	0	0
b (in Hg)	28.82	28.88	28.82	28.82	28.88	28.82
t (°F)	60.6	60.4	60.6	60.6	60.4	60.6
K_h	1.073	1.066	1.073	1.064	1.058	1.064
K_d	0.994	0.996	0.994	0.994	0.996	0.994
$V_{CRS\ LI}$ (kV)	1470	1438	1446	1650	1645	1639
$V_{CRSA\ LI}$ (kV)	**1451**			**1645**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 1410 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 369, **Catalog No. 369ET1300 passed impulse withstand voltage tests according to ANSI C29.9, cl. 7.2.3.**

The rated critical-impulse flashover voltage 1410 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 1297 kV. All test samples met

the requirements. Station post insulator TR 369, **Catalog No. 369ET1300 passed critical impulse flashover voltage tests according to ANSI C29.9, cl. 7.2.2.**

GAMMA-CERISOL Catalog 369ET1300

Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.

The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

Station post insulator			
	Sample No.1	**Sample No.2**	**Sample No. 3**
b (in Hg)	29.03	29.03	29.03
t (°F)	59.7	59.7	59.9
V_T (kV)	**RIV (µV)**	**RIV (µV)**	**RIV (µV)**
242	631	794	631
220	**355**	**501**	**447**
198	251	316	282
176	158	224	224
154	126	126	126
132	100	100	100
110	79	7	9
88	5	5	5
66	5	5	5
0	5	5	5
Rated value: ma. 1000 µV at 220 kV/1.0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 220kV (1MHz) are less than 1000 µV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 369, catalog No. 369ET1300 **passed** radio-influence voltage tests according to ANSI C29.9, cl. 7.2.4.

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 °F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F/ 10 min and 39 °F/ 10 min)	Low-frequency Momentary Flashover Voltage Test	Flashover voltage (kV)	Result
Test sample #1	No failure	No failure	764	**Passed**
Test sample #2	No failure	No failure	752	**Passed**
Test sample #3	No failure	No failure	760	**Passed**

No Failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements. Station post insulator TR 369, **Catalog No. 369ET1300 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.**

GAMMA-CERISOL Catalog 369ET1300
Design Test Certification

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 60,000 lbs. (266.880 kN). Smooth increase in load 450 - 900 lbs. /s. (2 - 4 kN/s), Smooth load up until 89,923 lbs. (400 kN), 3 sec hold on this level and unloading, visual inspection.

Compression Strength Test Results

Sample No.	Load 89,923 lbs. Load (400 kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 40,000 lb.-in. (4.52 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up until 44,253.73 lb.-in. (5 kNm), 3 sec hold on this level and unloading, visual inspection.

Torsional Strength Test Results

Sample No.	Torsional moment 44,248 lb.-in. (5 kNm) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 2,050 lbs. (9.118 kN), Increase in load 9.0 – 15.74 lbs. /s (0.04 - 0.07 kN/s), smoothly until failure

Cantilever Strength Test Results

Sample No.	Maximum failing load lbs. (kN)	Way of failure	Result (MFL)
1	3,331.67 (14.82)	Failed at bottom part of ceramic core	**Passed**
2	3,167.56 (14.09)	Failed at bottom part of ceramic core	**Passed**
3	2,542.59 (11.31)	Failed at bottom part of ceramic core	**Passed**
Average	3,012.44 (13.4)		

GAMMA-CERISOL Catalog 369ET1300
Design Test Certification

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 20,000 lbs. (88.960 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up until 26,977.07 lbs. (120 kN), 3 sec hold on this level and unloading, visual inspection.

Tensile Strength Test Results

Sample No.	Load 26,977.07 lbs. (120 kN Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

Tests performed at EGU HV Laboratory a. s., Test No.10060/D/14, and The Klokner Institute, Report No. 55/14/AL. All test results contained in this document are held on file under drawing number reference H21369EJ.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation

Design Test Certification

Material Tested	**GAMMA-CERISOL Catalog Number 391ST1800**
TEST OBJECT:	Station Post Insulator
TYPE SPECIFICATION:	TR 391
TEST STANDARDS:	ANSI C29.9, ANSI C29.1, NEMA No. 107:1993

SCHEDULE OF TESTS

Design Tests, Section 7.2

Page	Test Section	Description of Test
Electrical Tests		
2	7.2.1	Low-frequency Wet Withstand Voltage
3	7.2.2 & 7.2.3	Critical Impulse Flashover Positive & Impulse Withstand Voltage
5	7.2.4	Radio-influence voltage tests
Mechanical Tests		
6	7.2.5	Thermal shock test
7	7.2.6	Compression Strength
8	7.2.7	Torsional Strength
	Quality Conformance Tests, Section 7.3	
9	7.3.4	Cantilever Strength
10	7.3.5	Tensile Strength

All Electrical tests were performed per the requirements of ANSI test standard C29.9:2012, ANSI C29.1:2012, and NEMA No. 107:1993. All Mechanical tests were performed per the requirements of ANSI test standard C29.9 - 1983 (R1996), and ANSI C29.1 – 1988 (R2002).

GAMMA-CERISOL Catalog 391ST1800
Design Test Certification

7.2.1 Low-frequency Wet Withstand Voltage

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.1. The rated wet withstand voltage was applied on each of the tested post insulator for 10 seconds.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Low-frequency Wet Withstand Voltage Test Results

Station post insulator			
	Sample No. 1	**Sample No.2**	**Sample No.3**
b (in Hg)	29.4	29.4	29.4
t (°F)	59.2	59.2	59.2
r.i. (mm/min)	5.0	5.0	5.0
R_w (Ωm)	200.0	200.0	200.0
V_{LW} (kV)	**710**	**710**	**710**
T (s)	10	10	10
result	No flashover occurred	No flashover occurred	No flashover occurred

No flashover occurred during the test at the rated wet withstand voltage 230 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 391, **Catalog No. 391ST1800 passed low-frequency wet withstand voltage tests according to ANSI C29.9, cl. 7.2.1.**

7.2.2 & 7.2.3 Impulse Withstand Voltage Test and Flashover Voltage

The tests were carried out on the three post insulators according to ANSI C29.9, cl. 7.2.2 and 7.2.3. Three consecutive impulses of the rated impulse-withstand value of both polarities were applied on each of tested post insulator. The critical impulse voltages of both polarities were determined by the up and down method with 30 impulses.

The test arrangement was set up according to ANSI C29.1, cl. 3.3

Impulse Withstand Voltage and Flashover Voltage Test Results

Polarity	**+**			**-**		
Test Sample No.	**1**	**2**	**3**	**1**	**2**	**3**
V_{IW} (kV)	**1800**	**1800**	**1800**	**1800**	**1800**	**1800**
Impulses	3	3	3	3	3	3
Flashovers	0	0	0	0	0	0
b (in Hg)	29.0	29.0	29.0	29.0	29.0	29.0
t (°F)	60.1	60.1	60.1	60.1	60.1	60.1
K_h	1.001	1.001	1.001	1.001	1.001	1.001
K_d	1.073	1.073	1.073	1.064	1.064	1.064
$V_{CRS\ LI}$ (kV)	2143	2139	2110	2316	2292	2302
$V_{CRSA\ LI}$ (kV)	**2131**			**2303**		

No flashover occurred during the test with three impulses at the rated impulse-withstand voltage 1800 kV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 391, **Catalog No. 391ST1800 passed impulse withstand voltage tests according to ANSI C29.9, cl. 7.2.3.**

The rated critical-impulse flashover voltage 2000 kV is specified by ANSI C29.9, Table 2. The average values of critical-impulse flashover voltages are higher than 92 percent of the rated critical-impulse flashover voltage, i.e. 1840 kV. All test samples met the requirements. Station post insulator TR 391, **Catalog No. 391ST1800 passed critical-impulse flashover voltage tests according to ANSI C29.9, cl. 7.2.2.**

GAMMA-CERISOL Catalog 391ST1800
Design Test Certification

7.2.4 Radio-influence Voltage (RIV) Test

The tests were carried out on three post insulators according to ANSI C29.9, cl. 7.2.4. Radio-influence voltage was measured at the frequency 1.0 MHz in accordance with circuit diagram in Figure 3 – 3a of NEMA No. 107, Section 3.
The test arrangement was set up according to ANSI C29.1, cl. 4.9.1.

Radio-influence Voltage (RIV) Test Results

Station post insulator			
	Sample No.1	**Sample No.2**	**Sample No. 3**
b (in Hg)	29.03	29.03	29.03
t (°F)	60.1	60.1	60.1
V_T (kV)	**RIV (µV)**	**RIV (µV)**	**RIV (µV)**
350	562	562	794
318	**100**	**112**	**89**
286	56	63	56
254	32	28	35
222	20	20	18
190	5	5	5
158	5	5	5
126	5	5	5
0	5	5	5
Rated value: ma. 2000 µV at 318 kV/1.0 MHz			

Measured values of radio-influence voltages on post insulators at test voltage 318kV (1MHz) are less than 2000 µV specified by ANSI C29.9, Table 2. All test samples met the requirements. Station post insulator TR 391, **Catalog No. 391ST1800 passed radio-influence voltage tests according to ANSI C29.9, cl. 7.2.4.**

7.2.5 Thermal Shock Test

The test was carried out on three post insulator according to ANSI C 29.9, cl 7.2.5. Each tested post insulator was first immersed in a hot water bath 150 °F (66 °C) for 10 minutes. Then it was withdrawn and immersed in a cold water bath 39 °F (4 °C) for 10 minutes. After tenth cycle each post insulator was tested for electrical soundness by low-frequency momentary flashover voltage test.

Thermal Shock Test Results

	10 cycles (150 °F/ 10 min and 39 F/ 10 min)	Low-frequency Momentary Flashover Voltage Test	Flashover voltage (kV)	Result
Test sample #1	No failure	No failure	937	**Passed**
Test sample #2	No failure	No failure	945	**Passed**
Test sample #3	No failure	No failure	929	**Passed**

No Failure occurred during the thermal shock test according to ANSI C29.9, cl. 7.2.5. All test samples met the requirements. Station post insulator TR 391, **Catalog No. 391ST1800 passed thermal shock test according to ANSI C29.9, cl. 7.2.5.**

GAMMA-CERISOL Catalog 391ST1800
Design Test Certification

7.2.6 Compression Strength Test

Temperature 68 -71.6 °F (20-22 °C), Minimum failing load 60,000 lbs. (266.880 kN). Smooth increase in load 450 - 900 lbs. /s. (2 - 4 kN/s), Smooth load up until 89,923 lbs. (400 kN), 3 sec hold on this level and unloading, visual inspection.

Compression Strength Test Results

Sample No.	Load 89,923 (400 kN), Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.2.7 Torsional Strength Test

Temperature during test + 73.4 °F (+ 23 °C), Minimum failing load (MFL) 40,000 lb.-in. (4.52 kNm), Smooth increase in load 265.52- 442.54 lb.-in./s (0.03 – 0.05 kNm/s), Smooth load up until 44,253.72 lb.-in. (5 kNm), 3 sec hold on this level and unloading, visual inspection.

Torsional Strength Test Results

Sample No.	Torsional moment 44,253.72 lb.-in (5 kNm) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

7.3.4 Cantilever Strength Test

Temperature during test + 71.6 °F (+ 22 °C), Minimum failing load (MFL) 1,400 lbs. (6.227 kN), Increase in load 6.74 – 13.49 lbs. /s (0.03 - 0.06 kN/s), smoothly until failure

Cantilever Strength Test Results

Sample No.	Maximum failing load [kN]	Way of failure	Result (MFL)
1	9.26	Failed at bottom part of ceramic core	**Passed**
2	7.04	Failed at bottom part of ceramic core	**Passed**
3	7.84	Failed at bottom part of ceramic core	**Passed**
Average	8.05		

GAMMA-CERISOL Catalog 391ST1800
Design Test Certification

7.3.5 Tensile strength

Temperature 68 – 69.8 °F (20-21 °C), Minimum failing load (MFL) 20,000 lbs. (88.960 kN**),** Increase in load 6.74 – 13.49 lbs./s (0.3 – 0.6 kN/s), smoothly. Smooth load up until 26,977.07 lbs. (120 kN), 3 sec hold on this level and unloading, visual inspection.

Tensile Strength Test Results

Sample No.	Load 26,977.07 lbs. (120 kN) Applied for 3 sec	Result (MFL)
1	Insulator did not fail	**Passed**
2	Insulator did not fail	**Passed**
3	Insulator did not fail	**Passed**

Tests performed at EGU HV Laboratory a. s., Test No.10060/E/14, and The Klokner Institute, Report No. 54/14/AL.
All test results contained in this document are held on file under drawing number reference H21391EJ.

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Frank Escobar
Chief Engineer, GAMMA Insulators Corporation