Safe-Lec 2 Overview & Design Features

Safe-Lec 2™ - The "next generation" in electrification for overhead cranes and other moving equipment. This modern system delivers safe, reliable power in a rugged, easy-to-install package. **UL Listed.**

Safe-Lec 2 is ideal for:

- Small to medium cranes
- Monorails
- Conveyor systems
- Material Handling Equipment
- Moderately curved systems
- Amusement rides

Ampacity range:

60A, 100A, 125A, 160A, 200A, 250A, 315A, & 400A capacities up to 600 volts maximum.

Maximum Speed:

1200 ft/min

Options:

Heater wire systems (Pg. 26), stainless steel hardware, green bonding (ground) conductor covers, black "UV resistant" outdoor covers, curved systems to a minimum of 60" radius (curved at our factory).

Safe-Lec 2 Features:

- Positive shoe tracking and superior conductivity. Long-wearing shoe is guided by the V-contact in the rail.
- Robust collector arm articulates to help maintain contact.
- IP2 "finger safe" operation; no live parts exposed.
- Secure, bolted splice joints pre-installed on conductors for superior electrical connection. Won't pull apart over time. Includes one-piece snap-on cover.
- Integrated collector cables; won't snag on moving equipment.
- Peaked insulating covers to shed dust and water. The same cover profile fits all bar styles; fewer parts to stock.

Safe-Lec 2 Installs Quickly:

- Less expense and shorter crane downtime.
- Requires fewer splice joints; 14' 9" (4.5m) rail lengths versus 10' for most other systems.
- Includes pre-installed splice joints on one end of bar.
- Uses multi-pole hanger; multiple bars snap into the same hanger and hanger mounts with a single bolt.
- Requires fewer expansion joints; up to 492' (150m) without an expansion section.
- Is easy to install and align with slotted hanger brackets.
- Is easy to wire; power wires connect to lug at base of collector. Requires no in-line splices or connectors.

Safe-Lec 2 Overview & Design Features

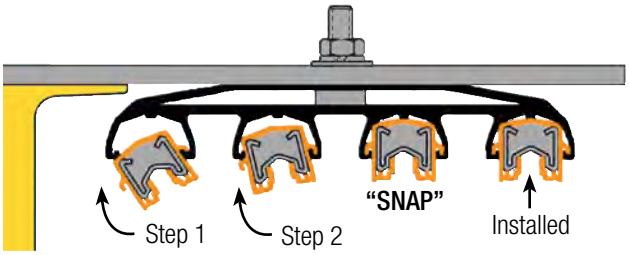
Here are several specific reasons why Safe-Lec 2 is superior to a traditional (and now outmoded) 8-Bar system. And we should know . . . we invented 8-Bar over 50 years ago!

Safe-Lec 2

8-Bar

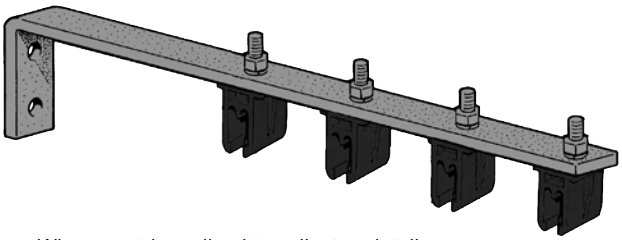
Quicker and less costly Installation

- 14.76 ft (4.50m) bar lengths; fewer joints
- Multiple pole hangers; a "snap" to install



- Wires connect into lug integrated in the collector arm

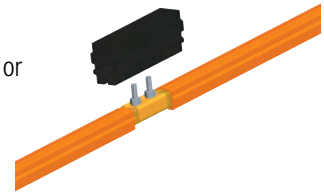
- 10 ft (3.05m) bar lengths; more splices required
- Hangers hold only one bar each



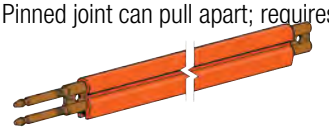
- Wires must be spliced to collector pigtails

More secure splice joint

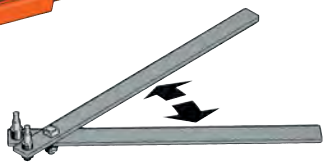
- Bolted joints
- No special tools required
- No need for "joint keepers" or "joint repair kits", etc



- Pinned joint can pull apart; requires special parts



- Special tool required



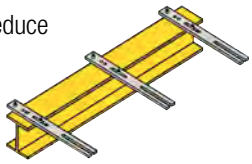
Fewer expansion sections required

- Safe-Lec 2 can go 492 ft (150m) before an expansion is required

- 8-Bar can only go 300 ft before an expansion section is required (or 200 ft for copper bar)

Easier system alignment

- Slotted brackets are available to reduce hole alignment problems
- System alignments are easy!



- Brackets have round holes, so alignment must be perfect
- Harder to make system alignment adjustments

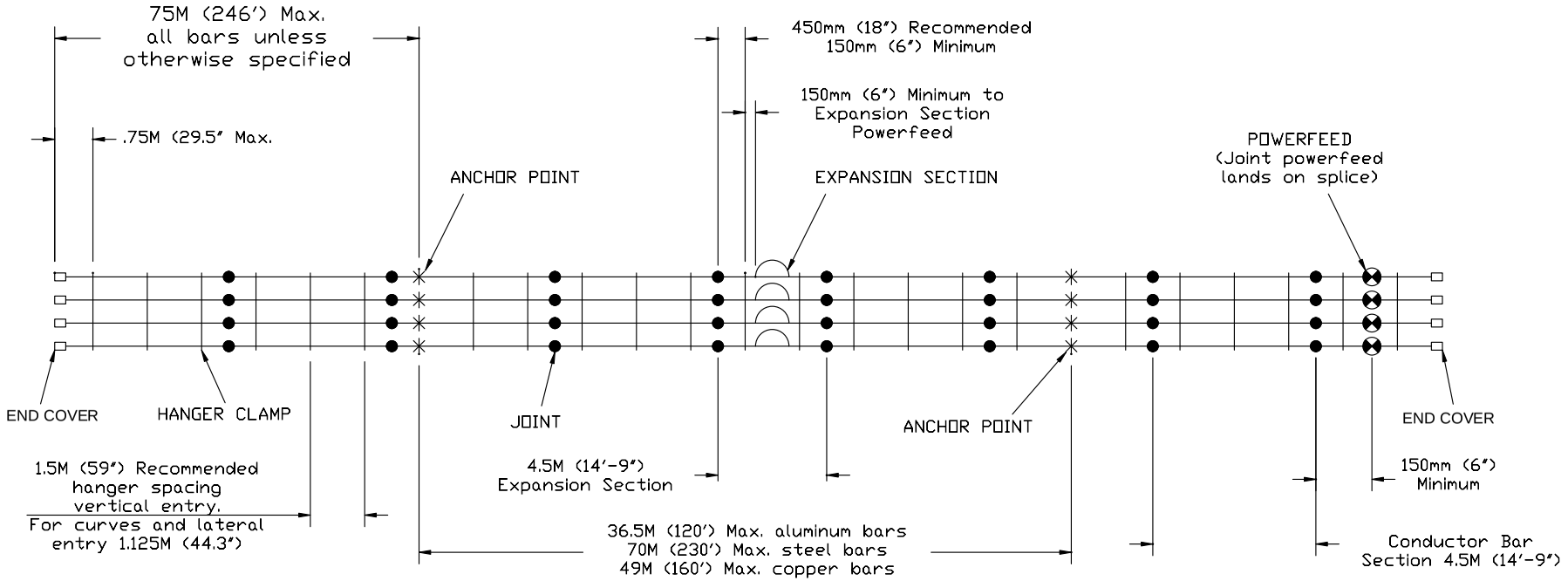
Superior Collector Shoe Tracking

- Shoe is guided by the V-contact in the metal bar
- Collector arm articulates to accommodate mild system misalignments

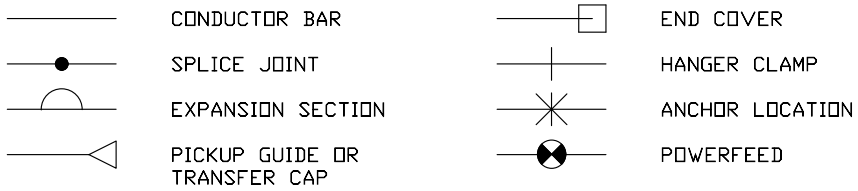
- Shoe is guided by the plastic cover
- Accurate system alignment is much more critical

Typical 4-Bar Safe-Lec 2 System

EXAMPLE OF 4 CONDUCTOR RUNWAY
SAFELEC 2
(3 PHASE + 1 GROUND)



NOTES: Maximum length without expansions:
150M (492'), use anchor clamp at center



Minimum Conductor Spacing	All styles of conductor hangers **1.7" (43 mm)**

Electrical Ratings for Safe-Lec 2

Voltage Drop Calculations

Volt drop calculation ^3U:

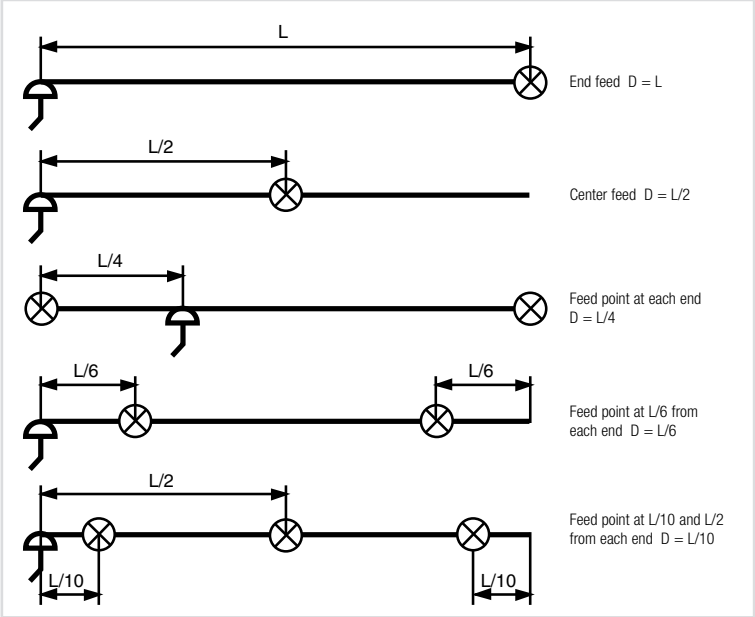
3-Phase AC	$^3U = 3 \times I \times D \times Z$
Single Phase AC	$^3U = 2 \times I \times D \times Z$
Continuous current DC	$^3U = 2 \times I \times D \times R$

$$^3U\% = (^3U \times 100) / U_n$$

Where:

- ^3U: voltage drop in Volts
- $^3U\%$: voltage drop in % of nominal voltage
- U_n: nominal supply voltage in volts
- I: maximum current in amps
- D: see opposite diagram (in meters)
- R: resistance in ohms per meter (see Pg. 13)
- Z: impedance in ohms per meter (see Pg. 13)

See Appendix I and Appendix II for more information about voltage drop.



Current Rating

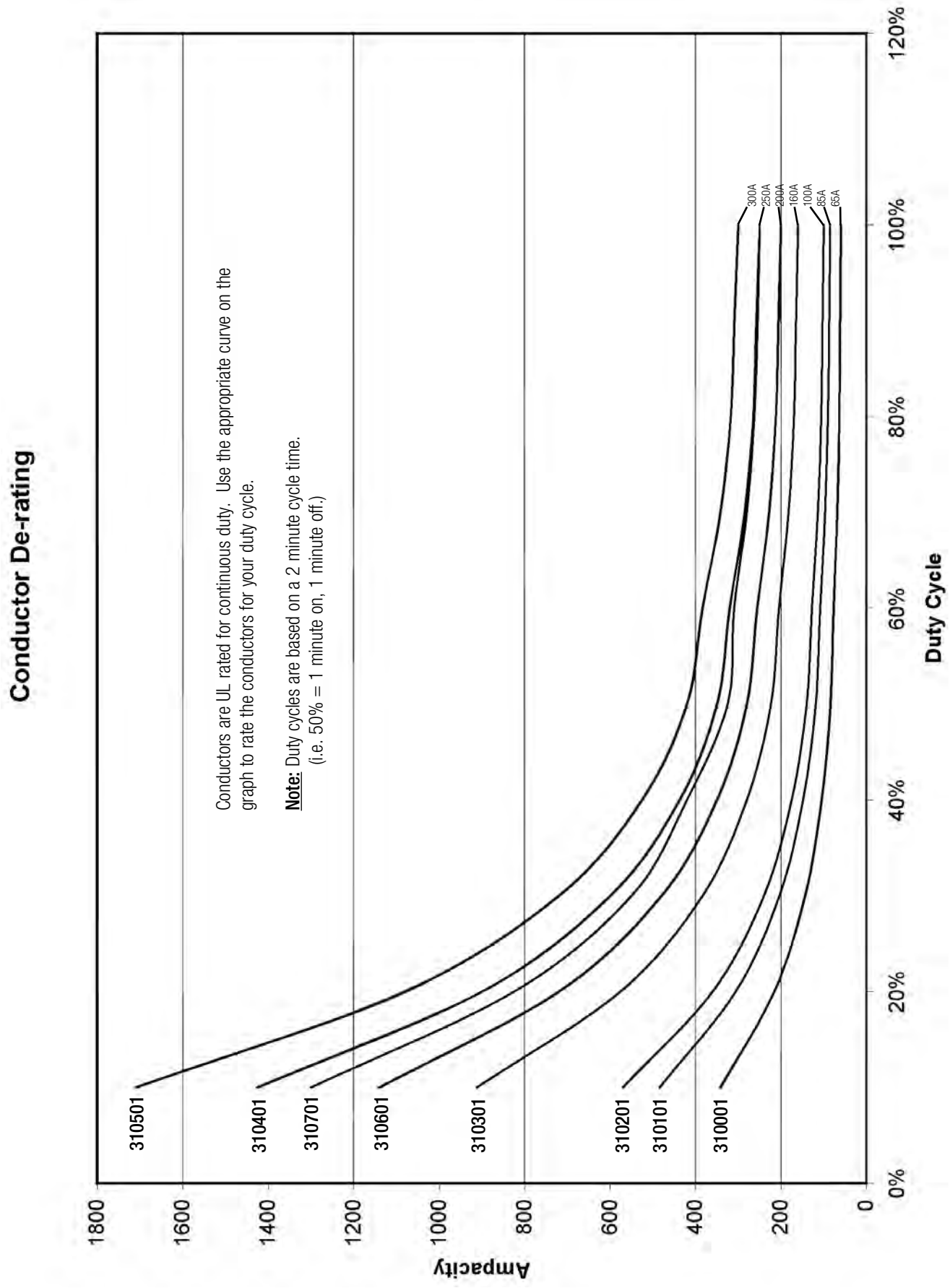
The maximum allowable continuous current rating of the conductor bar depends on the Duty Factor "K" of the cranes and the maximum ambient temperature Ta. Allowable current (I) is calculated using the following formula:

$$I_{allowable} = \text{Nominal Current} \times K$$

Factor "K"						
	Ta \ Duty	100%	80%	60%	40%	20%
Standard Cover	77°F (25°C)	1.000	1.118	1.291	1.581	2.236
	95°F (35°C)	0.905	1.011	1.168	1.430	2.023
	113°F (45°C)	0.798	0.892	1.030	1.261	1.784
	130°F (55°C)	0.674	0.754	0.870	1.066	1.508
Medium Heat Cover	150°F (65°C)	0.775	0.866	1.000	1.225	1.732
	167°F (75°C)	0.707	0.791	0.913	1.118	1.581
	185°F (85°C)	0.632	0.707	0.816	1.000	1.414

For UL rated capacities, see graph on Pg. 12

Safe-Lec 2 Electrical Ratings



Safe-Lec 2 Specifications

The appropriate conductor bar can be chosen only when all the relevant factors are known. Please refer to the Data Sheet on Pg. 6, and to Appendices I through IV at the back of this catalog. Also, please consult Conductix-Wampfler sales if you have any questions about the suitability of this product to your application.

Safe-Lec 2 Conductor Bar

	Galvanized Steel			Copper			Aluminum / Stainless Steel		
Nominal Current	60A	100A	125A	160A	250A	400A	200A	315A	400A
Cross Sectional Area	50mm^2	63mm^2	93mm^2	50mm^2	63mm^2	93mm^2	104mm^2	120mm^2	156mm^2
Maximum System Voltage AC or DC (Per UL listing) ✱	600V	600V	600V	600V	600V	600V	600V	600V	600V
Resistance R (for DC) at 20^0 C (Ω/m))	0.003584	0.002867	0.001933	0.000342	0.000274	0.000184	0.000301	0.000261	0.000199
Impedance Z (for AC) at 20^0 C (Ω/m)	0.003604	0.002891	0.001968	0.000364	0.000300	0.000221	0.000325	0.000288	0.000234
Maximum Allowable Ambient Temperature for 100% Duty Cycle	25^{0}C	25^{0}C	25^{0}C	25^{0}C	25^{0}C	25^{0}C	25^{0}C	25^{0}C	25^{0}C
Bar Length	4.5m	4.5m	4.5m	4.5m	4.5m	4.5m	4.5m	4.5m	4.5m
Support Pitch Standard Lateral	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm	1500mm 1125mm
Minimum Pitch Centers Standard	43mm	43mm	43mm	43mm	43mm	43mm	43mm	43mm	43mm
Expansion Sections (Not required for runs less than)	150m	150m	150m	150m	150m	150m	150m	150m	150m
Minimum Bending Radius (Horizontal only, bent at factory)	1.5m	1.5m	1.5m	1.5m	1.5m	1.5m	1.5m	1.5m	1.5m

✱ Contact Conductix-Wampfler for other voltages

Safe-Lec 2 Conductor Bar Covers

	Standard (Orange or Green)	UV Stable (Black)	Medium Heat (Red)
Material	PVC	PVC	Polycarbonate
Dielectric Strength	180 kv/cm	180 kv/cm	240 kv/cm
Surface Resistivity	$10^{11}\Omega$	$10^{11}\Omega$	$>10^{14}\Omega$
Volume Resistivity	$>10^{15}\Omega$/cm	$>10^{15}\Omega$/cm	$>10^{16}\Omega$/cm
Vicat Softening Temperature **Never expose PVC cover to temperatures in excess of 176^0 F (80^0 C)**	160^{0}F (71.1^{0}C)	160^{0}F (71.1^{0}C)	250^{0}F (121.1^{0}C)
Flame Test	Self extinguishing	Self extinguishing	Self extinguishing
Oxygen Index	54%	54%	24%
Specific Density	1.5 g/cm^3	1.5 g/cm^3	1.15 g/cm^3