



# CIR<sup>®</sup>-2

TC-ER-HL CRUSH & IMPACT RESISTANT  
CABLES *WITHOUT EXTERNAL ARMORING*  
FOR OIL & GAS OPERATIONS





# INDEX

## CIR<sup>®</sup>-2

**Crush and Impact Resistant  
Without External Armoring**

Passes the same  
crush and impact testing  
required by  
UL 2225 for Type MC-HL

- Highly Flexible
- GEXOL<sup>®</sup> Insulated
- Designed for extreme cold environments
- Easier and Safer to Install

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## CIR<sup>®</sup>-2 RATINGS & APPROVALS

- UL Listed as TC-ER-HL (E123629):  
Suitable for Class 1, Div 1 and Zone 1 environments
- UL Listed as Type TC-ER:  
Suitable for use in Class I, Div 2  
and Zone 2 environments
- Severe cold durability
  - Exceeds CSA cold bend/cold impact  
(-40°C/-35°F)
  - Brittlepoint as per ASTM D 7646-07 exceeds  
-65°C for Jacket and -75°C for insulation
- 90°C temperature rating
- Flame Retardant – IEEE 1202

AmerCable believes the information presented throughout this catalog to be reliable and current. All information is subject to change without notice. The information listed is approximate, and is presented only as a guide for product selection. We make no claims or warranties for the suitability of any product for any particular application. Cable diameters are subject to a +/- 5% manufacturing tolerance.

# CIR<sup>®</sup>-2 OVERVIEW

AmerCable's CIR<sup>®</sup> is a flexible cable family designed to replace older-technology designs like Type MC. Successfully used globally since 2002, AmerCable CIR is designed for reliable performance on mission-critical equipment operating in harsh oil and gas environments.

CIR-2 is ideal for downstream/midstream facilities, well pads and land drilling operations where environmental conditions present unique challenges to a cable's service life. CIR-2 cables comply with the requirements for hazardous location cables required by UL 2225.

This highly robust cable offers significant advantages over Type MC:

- **Highly flexible** – unlike Type MC, CIR is flexible for easier installation. The cable can also be reused during an upgrade or retrofit.
- **Extremely cold environments**
  - Exceeds CSA cold bend/cold impact (-40°C/-35°C)
  - Brittlepoint as per ASTM D 746-07 exceeds -65°C for the Jacket and -75°C for the Insulation.
- **Insulated with GEXOL<sup>®</sup>** – AmerCable's exclusive insulating compound provides superior flexibility, dielectric properties and field proven performance in the harshest environments.
- **Smaller bend radius** (up to 40% smaller) and Reduced tray fill (up to 35% less) compared to Type MC
- **Gas & vapor tight** – impervious to water and air
- **UL Listed as Type TC-ER-HL** – suitable for use in Class 1, Div 1 and Zone 1 environments including those where tray cables are not practical or cost-prohibitive.
- **UL Listed as Type TC-ER** – suitable for a variety of uses, including those where tray cables are not practical or cost-prohibitive.

## Faster and Easier to Install than Metal Clad

CIR<sup>®</sup> is the fastest, safest crush-proof cable to install. Metal clad cable installation requires an expensive box of tools and a multi-step procedure for jacket removal.

**Lower Total  
Installed  
Cable Cost**

See page 9

# CIR®-2 POWER CABLE GEXOL® INSULATED

THREE & FOUR CONDUCTOR + GROUND • 0.6/1KV • RATED 90°C



## CONDUCTOR

Soft annealed flexible stranded tinned copper per IEEE 1580 Table 11.

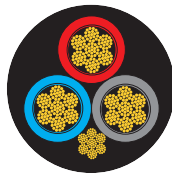
## INSULATION

GEXOL® cross-linked flame retardant polyolefin, meeting the requirements for Type P of IEEE 1580 and Type X110 of UL 1309/CSA 245. 600V/IEC 1000V.

**Brittlepoint as per ASTM D 746-07 exceeds -65°C for Jacket and -75°C for Insulation**

## JACKET

A black, flame retardant, oil, abrasion, chemical and sunlight resistant thermoset compound meeting UL 1309/CSA 245 and IEEE 1580.



## CIR-2 POWER CABLE RATINGS & APPROVALS

- 90°C temperature rating
- UL Listed as TC-ER-HL – suitable for Class 1, Div 1 and Zone 1 environments
- UL Listed as Type TC-ER – suitable for use in Class I, Div 2 and Zone 2 environments
- Flame Retardant – IEEE 1202

## APPLICATION

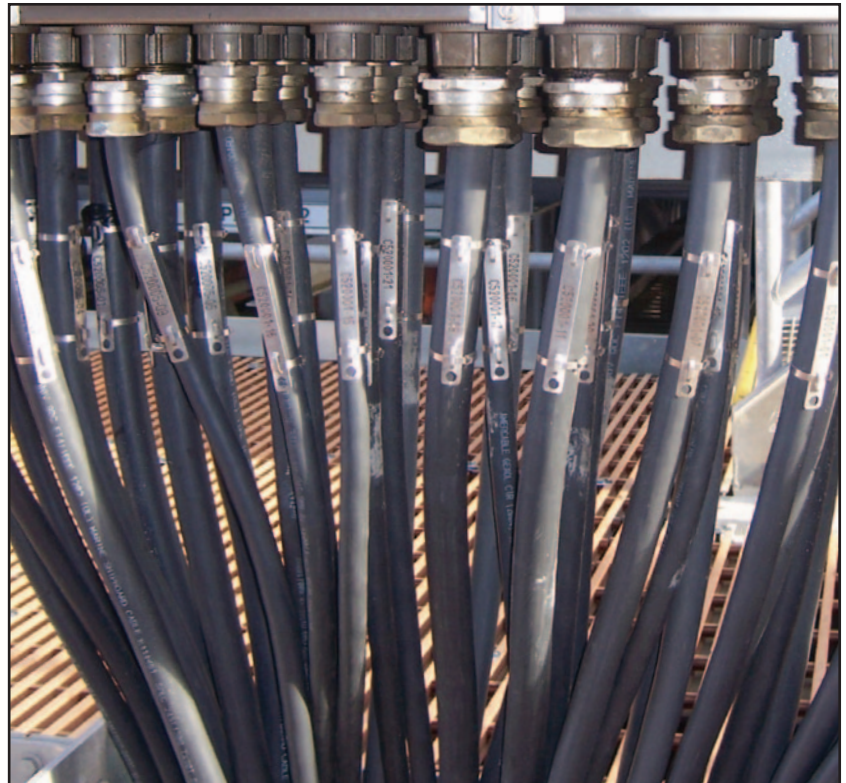
A flexible alternative to Type MC cable where user requires crush and impact protection for cables.

## FEATURES

- Complies with the requirements for TC-ER-HL per UL 2225
- Rated TC-ER
- Exceeds CSA cold bend /cold impact (-40°C / -35°C)
- Brittlepoint as per ASTM D 746-07 exceeds -65°C for Jacket and -75°C for Insulation
- Gas & vapor tight – impervious to water & air

## CIR vs. TYPE MC

- Smaller bend radius (up to 40% smaller)
- Reduced tray fill (up to 35% less)
- Considerably more flexible
- Reduced installation time and cost
- Glands cost up to 50% LESS



# CIR®-2 POWER CABLE

| Conductor Size |                 | Number of Conductors | Grounding Conductor AWG/kcmil | Part No. 37-102- | Nominal Diameter (inches) | Weight (lbs/1000 ft.) | 90°C NEC Ampacity | 75°C NEC Ampacity | DC Resistance at 25°C Ampacity | AC Resistance at 90°C, 60Hz (ohms/1000 ft.) | Inductive Reactance (ohms/1000 ft.) | Voltage Drop (Volts/Amp/ 1000 ft.) |
|----------------|-----------------|----------------------|-------------------------------|------------------|---------------------------|-----------------------|-------------------|-------------------|--------------------------------|---------------------------------------------|-------------------------------------|------------------------------------|
| AWG/kcmil      | mm <sup>2</sup> |                      |                               |                  |                           |                       |                   |                   |                                |                                             |                                     |                                    |
| 14             | 2.1             | 3                    | 14                            | 508CIRGAG2       | 0.532                     | 165                   | 15                | 15                | 2.91                           | 3.64                                        | 0.04                                | 5.069                              |
| 14             | 2.1             | 4                    | 14                            | 509CIRGAG2       | 0.572                     | 195                   | 15                | 15                | 2.91                           | 3.64                                        | 0.04                                | 5.072                              |
| 12             | 3.3             | 3                    | 12                            | 516CIRGAG2       | 0.580                     | 213                   | 20                | 20                | 1.83                           | 2.28                                        | 0.03                                | 3.195                              |
| 12             | 3.3             | 4                    | 12                            | 517CIRGAG2       | 0.700                     | 288                   | 20                | 20                | 1.83                           | 2.28                                        | 0.04                                | 3.198                              |
| 10             | 5.2             | 3                    | 10                            | 308CIRGAG2       | 0.685                     | 310                   | 30                | 30                | 1.15                           | 1.44                                        | 0.03                                | 2.028                              |
| 10             | 5.2             | 4                    | 10                            | 408CIRGAG2       | 0.740                     | 371                   | 30                | 28                | 1.15                           | 1.44                                        | 0.03                                | 2.031                              |
| 8              | 7.6             | 3                    | 10                            | 309CIRGAG2       | 0.821                     | 447                   | 55                | 50                | 0.708                          | 0.885                                       | 0.034                               | 1.261                              |
| 8              | 7.6             | 4                    | 10                            | 409CIRGAG2       | 0.888                     | 536                   | 44                | 40                | 0.708                          | 0.885                                       | 0.037                               | 1.263                              |
| 6              | 12.5            | 3                    | 8                             | 310CIRGAG2       | 0.915                     | 621                   | 75                | 65                | 0.445                          | 0.556                                       | 0.032                               | 0.803                              |
| 6              | 12.5            | 4                    | 8                             | 410CIRGAG2       | 1.100                     | 780                   | 60                | 52                | 0.445                          | 0.556                                       | 0.035                               | 0.806                              |
| 4              | 21              | 3                    | 6                             | 312CIRGAG2       | 0.944                     | 781                   | 95                | 85                | 0.300                          | 0.376                                       | 0.029                               | 0.550                              |
| 4              | 21              | 4                    | 6                             | 412CIRGAG2       | 1.037                     | 964                   | 76                | 68                | 0.300                          | 0.376                                       | 0.032                               | 0.553                              |
| 2              | 34              | 3                    | 6                             | 314CIRGAG2       | 1.100                     | 1082                  | 130               | 115               | 0.184                          | 0.230                                       | 0.028                               | 0.347                              |
| 2              | 34              | 4                    | 6                             | 414CIRGAG2       | 1.202                     | 1351                  | 104               | 92                | 0.184                          | 0.230                                       | 0.030                               | 0.350                              |
| 1/0            | 54              | 3                    | 6                             | 316CIRGAG2       | 1.329                     | 1665                  | 170               | 150               | 0.117                          | 0.147                                       | 0.028                               | 0.232                              |
| 1/0            | 54              | 4                    | 6                             | 416CIRGAG2       | 1.468                     | 1954                  | 136               | 120               | 0.117                          | 0.147                                       | 0.030                               | 0.235                              |
| 2/0            | 70              | 3                    | 4                             | 317CIRGAG2       | 1.445                     | 2042                  | 195               | 175               | 0.0929                         | 0.1174                                      | 0.0270                              | 0.190                              |
| 2/0            | 70              | 4                    | 4                             | 417CIRGAG2       | 1.600                     | 2417                  | 156               | 140               | 0.0929                         | 0.1174                                      | 0.0296                              | 0.193                              |
| 4/0            | 109             | 3                    | 4                             | 319CIRGAG2       | 1.792                     | 3106                  | 260               | 230               | 0.0585                         | 0.0753                                      | 0.0261                              | 0.131                              |
| 4/0            | 109             | 4                    | 4                             | 419CIRGAG2       | 1.948                     | 3842                  | 208               | 184               | 0.0585                         | 0.0753                                      | 0.0287                              | 0.134                              |
| 250            | 127             | 3                    | 3                             | 330CIRGAG2       | 1.925                     | 3683                  | 290               | 255               | 0.0488                         | 0.0635                                      | 0.0263                              | 0.115                              |
| 250            | 127             | 4                    | 3                             | 430CIRGAG2       | 2.106                     | 4383                  | 232               | 204               | 0.0488                         | 0.0635                                      | 0.0290                              | 0.118                              |
| 350            | 177             | 3                    | 3                             | 331CIRGAG2       | 2.206                     | 4448                  | 350               | 310               | 0.0344                         | 0.0456                                      | 0.0256                              | 0.090                              |
| 350            | 177             | 4                    | 3                             | 431CIRGAG2       | 2.440                     | 6216                  | 280               | 248               | 0.0344                         | 0.0456                                      | 0.0283                              | 0.093                              |
| 500            | 253             | 3                    | 2                             | 333CIRGAG2       | 2.540                     | 6115                  | 430               | 380               | 0.0251                         | 0.0348                                      | 0.0258                              | 0.075                              |
| 500            | 253             | 4                    | 2                             | 433CIRGAG2       | 2.872                     | 8655                  | 344               | 304               | 0.0251                         | 0.0348                                      | 0.0284                              | 0.078                              |
| 750            | 380             | 3                    | 1                             | 334CIRGAG2       | 2.975                     | 9042                  | 535               | 475               | 0.0166                         | 0.0253                                      | 0.0252                              | 0.061                              |
| 750            | 380             | 4                    | 1                             | 434CIRGAG2       | 3.353                     | 11812                 | 428               | 380               | 0.0166                         | 0.0253                                      | 0.0278                              | 0.063                              |

NOTE: Cable diameters are subject to a +/- 5% manufacturing tolerance.

Ampacities are based on Table 310.16 of the National Electrical Code (NEC) for conductors rate 90°C, in a multi-conductor cable, at an ambient temperature of 30°C. The 75°C column is provided for additional information. The ampacities shown apply to open runs of cable, installation in any approved raceway. Derating for more than three current carrying conductors within the cable is in accordance with NEC Table 310.15 (B) (2) (a). The ampacities shown also apply to cables installed in cable tray in accordance with NEC Section 392.11.

*For Cable Color Codes and Stranding Information see page 8*

## HAWKE GLAND TYPES

| Hawke Gland Types             | TYPE CIR                                      |
|-------------------------------|-----------------------------------------------|
| Industrial & Safe Area (IP68) | 121                                           |
| Increased Safety "EExe"       | 501/421                                       |
| Explosion Proof               | 710<br>Class I, Div. 2<br>Class I, Zone 1 & 2 |
| Flameproof "EExd"             | 501/421<br>Zone 1 & 2                         |

## BEND RADIUS

|                | TYPE CIR                                                                                                       |
|----------------|----------------------------------------------------------------------------------------------------------------|
| IEEE 45<br>NEC | 6X Diameter<br>< 1" (25mm)<br>4X Diameter<br>> 1" (25mm) < 2" (50mm)<br>5X Diameter<br>> 2" (50mm) 6X Diameter |



# CIR<sup>®</sup>-2 CONTROL CABLE GEXOL<sup>®</sup> INSULATED

MULTI-CONDUCTOR • 0.6/1KV • RATED 90°C



## CONDUCTOR

Soft annealed  
flexible stranded  
tinned copper  
per IEEE 1580  
Table 11.

## INSULATION

GEXOL<sup>®</sup> cross-linked flame  
retardant polyolefin, meeting  
the requirements for Type P  
of IEEE 1580 and Type X110  
of UL 1309/CSA 245.  
600V/IEC 1000V.

Brittlepoint as per  
ASTM D 746-07  
exceeds -65°C for  
Jacket and -75°C  
for Insulation

## JACKET

A black, flame retardant, oil,  
abrasion, chemical and  
sunlight resistant thermoset  
compound meeting UL 1309/  
CSA 245 and IEEE 1580.



## APPLICATION

A flexible alternative to Type MC cable where user requires  
crush and impact protection for cables.

## FEATURES

- Complies with the requirements for TC-ER-HL per UL 2225
- Rated TC-ER
- Exceeds CSA cold bend /cold impact (-40°C / -35°C)
- Brittlepoint as per ASTM D 746-07 exceeds -65°C for Jacket and -75°C for Insulation
- Gas & vapor tight – impervious to water & air

## CIR vs. TYPE MC

- Smaller bend radius (up to 40% smaller)
- Reduced tray fill (up to 35% less)
- Considerably more flexible
- Reduced installation time and cost
- Glands cost up to 50% LESS



For Cable  
Color Codes  
& Stranding  
Information,  
see page 8.

See page 2  
for CIR-2  
Ratings &  
Approvals

| Conductor Size |                 | Number of Conductors | Part No.<br>37-102- | Nominal Diameter (inches) | Weight (lbs/1000 ft.) | 90°C NEC Ampacity | 75°C NEC Ampacity | DC Resistance at 25°C (ohms/1000 ft.) | AC Resistance at 90°C, 60Hz (ohms/1000 ft.) | Voltage Drop (Volts/Amp/1000 ft.) |
|----------------|-----------------|----------------------|---------------------|---------------------------|-----------------------|-------------------|-------------------|---------------------------------------|---------------------------------------------|-----------------------------------|
| AWG            | mm <sup>2</sup> |                      |                     |                           |                       |                   |                   |                                       |                                             |                                   |
| 14             | 2.1             | 2                    | 507CIRGAG2          | 0.500                     | 137                   | 15                | 15                | 2.91                                  | 3.64                                        | 5.069                             |
| 14             | 2.1             | 3                    | 508CIRGAG2          | 0.532                     | 165                   | 15                | 15                | 2.91                                  | 3.64                                        | 5.069                             |
| 14             | 2.1             | 4                    | 509CIRGAG2          | 0.572                     | 195                   | 15                | 15                | 2.91                                  | 3.64                                        | 5.072                             |
| 14             | 2.1             | 5                    | 510CIRGAG2          | 0.673                     | 261                   | 15                | 15                | 2.91                                  | 3.64                                        | 5.072                             |
| 14             | 2.1             | 7                    | 521CIRGAG2          | 0.800                     | 345                   | 15                | 14                | 2.91                                  | 3.64                                        | 5.072                             |
| 14             | 2.1             | 9                    | 764CIRGAG2          | 0.813                     | 372                   | 15                | 14                | 2.91                                  | 3.64                                        | 5.072                             |
| 14             | 2.1             | 12                   | 585CIRGAG2          | 0.850                     | 447                   | 12                | 10                | 3.00                                  | 3.75                                        | 5.224                             |
| 14             | 2.1             | 19                   | 765CIRGAG2          | 1.090                     | 698                   | 12                | 10                | 3.00                                  | 3.75                                        | 5.224                             |
| 14             | 2.1             | 37                   | 514CIRGAG2          | 1.455                     | 1211                  | 10                | 8                 | 3.00                                  | 3.75                                        | 5.224                             |
| 12             | 3.3             | 2                    | 515CIRGAG2          | 0.539                     | 175                   | 20                | 20                | 1.83                                  | 2.28                                        | 3.195                             |
| 12             | 3.3             | 3                    | 516CIRGAG2          | 0.580                     | 213                   | 20                | 20                | 1.83                                  | 2.28                                        | 3.195                             |
| 12             | 3.3             | 4                    | 517CIRGAG2          | 0.700                     | 288                   | 20                | 20                | 1.83                                  | 2.28                                        | 3.198                             |
| 12             | 3.3             | 5                    | 560CIRGAG2          | 0.740                     | 333                   | 20                | 20                | 1.83                                  | 2.28                                        | 3.198                             |
| 12             | 3.3             | 7                    | 712CIRGAG2          | 0.865                     | 442                   | 20                | 17                | 1.83                                  | 2.28                                        | 3.198                             |
| 12             | 3.3             | 9                    | 766CIRGAG2          | 0.910                     | 483                   | 20                | 17                | 1.83                                  | 2.28                                        | 3.198                             |
| 12             | 3.3             | 12                   | 750CIRGAG2          | 0.935                     | 578                   | 15                | 12                | 1.88                                  | 2.35                                        | 3.294                             |
| 12             | 3.3             | 19                   | 767CIRGAG2          | 1.180                     | 920                   | 15                | 12                | 1.88                                  | 2.35                                        | 3.294                             |
| 12             | 3.3             | 37                   | 520CIRGAG2          | 1.500                     | 1548                  | 12                | 10                | 1.88                                  | 2.35                                        | 2.028                             |
| 10             | 5.2             | 2                    | 553CIRGAG2          | 0.582                     | 229                   | 30                | 30                | 1.15                                  | 2.35                                        | 2.028                             |
| 10             | 5.2             | 3                    | 308CIRGAG2          | 0.685                     | 310                   | 30                | 30                | 1.15                                  | 1.44                                        | 2.031                             |
| 10             | 5.2             | 4                    | 408CIRGAG2          | 0.740                     | 371                   | 30                | 28                | 1.15                                  | 1.44                                        | 2.031                             |
| 10             | 5.2             | 5                    | 561CIRGAG2          | 0.800                     | 433                   | 30                | 28                | 1.15                                  | 1.44                                        | 2.031                             |
| 10             | 5.2             | 7                    | 591CIRGAG2          | 0.930                     | 569                   | 28                | 24                | 1.15                                  | 1.44                                        | 2.031                             |
| 10             | 5.2             | 9                    | 768CIRGAG2          | 1.060                     | 712                   | 28                | 24                | 1.15                                  | 1.44                                        | 2.031                             |
| 10             | 5.2             | 12                   | 762CIRGAG2          | 1.135                     | 868                   | 20                | 17                | 1.18                                  | 1.48                                        | 2.092                             |

NOTE: Cable diameters are subject to a +/- 5% manufacturing tolerance.

Ampacities are based on Table 310.16 of the National Electrical Code (NEC) for conductors rated 90°C, in a multi-conductor cable, at an ambient temperature of 30°C. The 75°C column is provided for additional information. The ampacities shown apply to open runs of cable, installation in any approved raceway. Derating for more than three current carrying conductors within the cable is in accordance with NEC Table 310.15 (B) (2) (a). The ampacities shown also apply to cables installed in cable tray in accordance with NEC Section 392.11.

\*Rated TC-ER

# CIR<sup>®</sup>-2 INSTRUMENTATION CABLE • GEXOL<sup>®</sup> INSULATED

INDIVIDUALLY SHIELDED PAIRS/TRIADS • 0.6/1KV • RATED 90°C

## CONDUCTOR

Soft annealed flexible  
stranded tinned copper  
per IEEE 1580 Table 11.

## INSULATION

GEXOL<sup>®</sup> cross-linked  
flame retardant polyolefin,  
meeting the requirements  
for Type P of IEEE 1580  
and Type X110 of  
UL 1309/CSA 245.  
600V/IEC 1000V.

## JACKET

A black, flame  
retardant, oil,  
abrasion, chemical  
and sunlight resistant  
thermoset compound  
meeting UL 1309/  
CSA 245 and  
IEEE 1580.

## PAIRS/TRIADS

Each pair/triad is twisted  
with a bare tinned drain  
wire. Each pair/triad  
is shielded with  
polyester-backed  
aluminum foil tape to  
afford 100% coverage.  
Pair to pair, or triad  
to triad, isolation –  
plus overall shielding –  
is provided.

*For Cable  
Color Codes  
and  
Stranding  
Information  
see page 8*

## APPLICATION

A flexible alternative to Type MC cable where user  
requires crush and impact protection for cables.

## FEATURES

- Complies with the requirements for TC-ER-HL  
per UL 2225
- Rated TC-ER
- Exceeds CSA cold bend /cold impact (-40°C / -35°C)
- Brittlepoint as per ASTM D 746-07 exceeds  
-65°C for Jacket and -75°C for Insulation
- Gas & vapor tight – impervious to water & air

## CIR vs. TYPE MC

- Smaller bend radius (up to 40% smaller)
- Reduced tray fill (up to 35% less)
- Considerably more flexible
- Reduced installation time and cost
- Glands cost up to 50% LESS

See page 2 for CIR-2 Ratings & Approvals, and page 8 for Color Coding

| Conductor<br>Size |     |       |        | Part No.  | Nominal              | Weight             | DC Resistance           | Mutual                       | Inductance    |
|-------------------|-----|-------|--------|-----------|----------------------|--------------------|-------------------------|------------------------------|---------------|
| AWG               | mm2 | Pairs | Triads | 37-102-   | Diameter<br>(inches) | (lbs/<br>1000 ft.) | 20°C<br>(ohms/1000 ft.) | Capacitance<br>(nF/1000 ft.) | (mH/1000 ft.) |
| 16                | 1.3 | 1     | –      | 610CIRAG2 | 0.437                | 106                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | 2     | –      | 611CIRAG2 | 0.700                | 279                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | 4     | –      | 613CIRAG2 | 0.790                | 340                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | 8     | –      | 616CIRAG2 | 1.075                | 702                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | 12    | –      | 618CIRAG2 | 1.275                | 1062               | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | 24    | –      | 699CIRAG2 | 1.637                | 1560               | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | –     | 1      | 668CIRAG2 | 0.467                | 128                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | –     | 4      | 698CIRAG2 | 0.930                | 453                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | –     | 8      | 677CIRAG2 | 1.130                | 825                | 4.52                    | 32                           | 0.20          |
| 16                | 1.3 | –     | 12     | 734CIRAG2 | 1.380                | 1235               | 4.52                    | 32                           | 0.20          |

NOTE: Cable diameters are subject to a +/- 5% manufacturing tolerance



## VALUES

### #16 PAIRS / TRIADS

Capacitance – nF/1000 feet = 32

Inductance – mH/1000 = 0.20

Resistance – Ohms/1000 feet = 4.52 (@ 20°C)

Gexol<sup>®</sup> and CIR<sup>®</sup> are registered trademarks of  
AmerCable Incorporated.

# CIR®-2 TYPE VFD POWER CABLE UL LISTED AS TYPE TC-ER

THREE CONDUCTOR • GEXOL® INSULATED • 600V • RATED 90°C



## POWER CONDUCTORS (3)

Soft annealed flexible stranded tinned copper per IEEE 1580 Table 11.

## INSULATION (2kV)

Gexol® cross-linked flame retardant polyolefin, meeting the requirements for Type P of IEEE 1580 and Type X110 of UL 1309/CSA 245.

Color: Gray with printed phase I.D. (Black-Red-Blue)

## JACKET

A black, flame retardant, oil, abrasion, chemical and sunlight resistant thermoset CPE meeting UL 1309/CSA 245 and IEEE 1580.

## GROUND CONDUCTORS (3)

Soft annealed flexible stranded tinned copper per IEEE 1580 Table 11. Gexol® insulation sized per UL 1277. Color: Green

Note: Sizes over 1" OD have uninsulated grounds

## SHIELD

Overall tinned copper braid plus aluminum/polyester tape providing 100% coverage.



## CIR-2 VFD POWER CABLE RATINGS & APPROVALS

- 90°C temperature rating
- UL Listed as Type TC-ER – Suitable for use in Class I, Div 2 and Zone 2 environments
- Flame Retardant – IEEE 1202
- Suitable for use in Class I, Div 2 and Zone 2 environments

## APPLICATION

A flexible braid and foil shielded power cable specifically engineered for use in variable frequency AC motor drive (VFD) applications where user requires crush and impact protection.

## FEATURES

- Specially engineered cable design produces longer service life in VFD applications.
- Overall braid and foil shield provides 100% coverage containing VFD EMI emissions.
- Symmetrical insulated ground conductors reduce induced voltage imbalances and carry common mode noise back to the drive.
- High strand count conductors and braid shield design is much more flexible, easier to install and more resistant to vibration than Type MC.
- GEXOL's lower dielectric constant (standard XLPEs, EPRs and other Type P insulation materials have higher dielectric constants) reduces reflected wave peak voltage magnitudes. This allows for longer output cable distances and minimizes the effect of high frequency noise induced into the plant ground system.
- 2kV insulation thickness resists the repetitive 2x voltage spikes from 600V VFDs and reduces drive over current trip problems due to cable charging current.
- Passes the same stringent crush and impact testing required by UL 2225 for Type MC-HL
- Gas & vapor tight – impervious to water and air

## CIR-2 vs. TYPE MC

- Smaller bend radius (up to 40% smaller)
- Reduced tray fill (up to 35% less)
- Considerably more flexible
- Reduced installation time and cost
- Glands cost up to 50% LESS

## CIR®-2 TYPE VFD POWER CABLE

| Size<br>AWG/<br>kcmil | Part No.<br>37-102- | Nominal<br>Diameter<br>Inches | Weight<br>Per<br>1000 Ft. | DC<br>Resistance<br>@ 25°C<br>(Ohms/1k ft) | AC<br>Resistance @<br>90°C, 60 Hz<br>(Ohms/1k ft) | Inductive<br>Reactance<br>(Ohms/1k ft) | Voltage Drop<br>@ 90°C<br>(Volts/Amp/<br>1k ft) | Green<br>Insulated<br>Grounding<br>Size (AWG) | NEC Ampacities    |                     |               |
|-----------------------|---------------------|-------------------------------|---------------------------|--------------------------------------------|---------------------------------------------------|----------------------------------------|-------------------------------------------------|-----------------------------------------------|-------------------|---------------------|---------------|
|                       |                     |                               |                           |                                            |                                                   |                                        |                                                 |                                               | In<br>Free<br>Air | In<br>Cable<br>Tray | In<br>Conduit |
| 14                    | 508CIRVA2           | 0.742                         | 283                       | 2.907                                      | 3.635                                             | 0.040                                  | 5.073                                           | 18                                            | 15                | 15                  | 15            |
| 12                    | 516CIRVA2           | 0.815                         | 378                       | 1.826                                      | 2.283                                             | 0.038                                  | 3.199                                           | 18                                            | 20                | 20                  | 20            |
| 10                    | 308CIRVA2           | 0.871                         | 473                       | 1.153                                      | 1.441                                             | 0.036                                  | 2.032                                           | 14                                            | 30                | 30                  | 30            |
| 8                     | 309CIRVA2           | 0.893                         | 553                       | 0.708                                      | 0.885                                             | 0.037                                  | 1.263                                           | 14                                            | 65                | 55                  | 48            |
| 6                     | 310CIRVA2           | 1.093                         | 797                       | 0.445                                      | 0.556                                             | 0.033                                  | 0.804                                           | 12                                            | 87                | 75                  | 65            |
| 4                     | 312CIRVA2           | 1.225                         | 929                       | 0.300                                      | 0.376                                             | 0.031                                  | 0.552                                           | 12                                            | 114               | 95                  | 89            |
| 2                     | 314CIRVA2           | 1.341                         | 1276                      | 0.184                                      | 0.230                                             | 0.029                                  | 0.348                                           | 10                                            | 152               | 130                 | 119           |
| 1                     | 315CIRVA2           | 1.447                         | 1576                      | 0.147                                      | 0.184                                             | 0.029                                  | 0.285                                           | 10                                            | 177               | 145                 | 137           |
| 1/0                   | 316CIRVA2           | 1.566                         | 2144                      | 0.117                                      | 0.147                                             | 0.029                                  | 0.234                                           | 10                                            | 205               | 170                 | 163           |
| 2/0                   | 317CIRVA2           | 1.733                         | 2144                      | 0.093                                      | 0.117                                             | 0.028                                  | 0.192                                           | 10                                            | 237               | 195                 | 186           |
| 4/0                   | 319CIRVA2           | 1.874                         | 3131                      | 0.058                                      | 0.075                                             | 0.027                                  | 0.132                                           | 8                                             | 316               | 260                 | 253           |
| 262                   | 320CIRVA2           | 2.031                         | 3875                      | 0.048                                      | 0.063                                             | 0.027                                  | 0.115                                           | 6                                             | 362               | 297                 | 284           |
| 313                   | 321CIRVA2           | 2.130                         | 4709                      | 0.040                                      | 0.053                                             | 0.026                                  | 0.100                                           | 6                                             | 403               | 328                 | 319           |
| 373                   | 322CIRVA2           | 2.257                         | 5209                      | 0.034                                      | 0.045                                             | 0.025                                  | 0.088                                           | 6                                             | 449               | 362                 | 358           |
| 444                   | 323CIRVA2           | 2.400                         | 6310                      | 0.028                                      | 0.039                                             | 0.025                                  | 0.080                                           | 6                                             | 498               | 400                 | 396           |
| 535                   | 324CIRVA2           | 2.705                         | 7193                      | 0.024                                      | 0.033                                             | 0.026                                  | 0.072                                           | 6                                             | 555               | 445                 | 441           |
| 646                   | 326CIRVA2           | 2.898                         | 9217                      | 0.020                                      | 0.028                                             | 0.026                                  | 0.065                                           | 4                                             | 618               | 491                 | 487           |
| 777                   | 327CIRVA2           | 3.102                         | 10340                     | 0.016                                      | 0.025                                             | 0.025                                  | 0.060                                           | 4                                             | 687               | 546                 | 537           |



- Cable diameters are subject to a +/- 5% manufacturing tolerance
- Ampacity in Free Air: Based on 30°C ambient temperature per 2023 NEC Table B.2(3)
- Ampacity in Cable Tray: Based on 30°C ambient temperature per 2023 NEC Table 310.16
- Ampacity in Conduit: Based on 30°C ambient temperature per 2023 NEC Table B.2(1)

**See next page for  
Stranding Profile**

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# CIR<sup>®</sup>-2 CABLE COLOR CODES

## CONTROL CABLES

COLORED INSULATION

| CONDUCTOR # | BASE COLOR | TRACER COLOR |
|-------------|------------|--------------|
| 1           | Black      | –            |
| 2           | Red        | –            |
| 3           | Blue       | –            |
| 4           | Orange     | –            |
| 5           | Yellow     | –            |
| 6           | Brown      | –            |
| 7           | Red        | Black        |
| 8           | Blue       | Black        |
| 9           | Orange     | Black        |
| 10          | Yellow     | Black        |
| 11          | Brown      | Black        |
| 12          | Black      | Red          |
| 13          | Blue       | Red          |
| 14          | Orange     | Red          |
| 15          | Yellow     | Red          |
| 16          | Brown      | Red          |
| 17          | Black      | Blue         |
| 18          | Red        | Blue         |
| 19          | Orange     | Blue         |
| 20          | Yellow     | Blue         |
| 21          | Brown      | Blue         |
| 22          | Black      | Orange       |
| 23          | Red        | Orange       |
| 24          | Blue       | Orange       |
| 25          | Yellow     | Orange       |
| 26          | Brown      | Orange       |
| 27          | Black      | Yellow       |
| 28          | Red        | Yellow       |
| 29          | Blue       | Yellow       |
| 30          | Orange     | Yellow       |
| 31          | Brown      | Yellow       |
| 32          | Black      | Brown        |
| 33          | Red        | Brown        |
| 34          | Blue       | Brown        |
| 35          | Orange     | Brown        |
| 36          | Yellow     | Brown        |
| 37          | Black      | –            |

## POWER CABLES

6 AWG and smaller = colored insulation

4 AWG and larger = print

| CONDUCTOR # | COLOR  |
|-------------|--------|
| 1           | Black  |
| 2           | Red    |
| 3           | Blue   |
| 4           | Orange |

## INSTRUMENTATION CABLES

|                                              |                   |
|----------------------------------------------|-------------------|
| Pairs                                        | Black, White      |
| Triads                                       | Black, White, Red |
| Pair / Triad Number<br>Printed on Conductors |                   |



**Crush and Impact  
Resistant  
Without External  
Armoring**

**Safer to Handle  
Easier to Install**

## CIR-2 STRANDING PROFILES

| SIZE<br>AWG/ KCMIL | NUMBER OF<br>STRANDS | CLOSEST<br>IEEE 45<br>STD. SIZE | EQUIVALENT<br>METRIC SIZE<br>(MM <sup>2</sup> ) | UNINSULATED<br>CONDUCTOR<br>DIA. (INCHES) |
|--------------------|----------------------|---------------------------------|-------------------------------------------------|-------------------------------------------|
| 16                 | 19                   | 3                               | 1.32                                            | 0.059                                     |
| 14                 | 19                   | 4                               | 2.08                                            | 0.074                                     |
| 12                 | 19                   | 6                               | 3.29                                            | 0.093                                     |
| 10                 | 37                   | 10                              | 5.23                                            | 0.113                                     |
| 8                  | 37                   | 16                              | 7.57                                            | 0.136                                     |
| 6                  | 61                   | 26                              | 12.49                                           | 0.175                                     |
| 4                  | 133                  | 41                              | 21.11                                           | 0.258                                     |
| 2                  | 133                  | 66                              | 33.51                                           | 0.324                                     |
| 1/0                | 266                  | 106                             | 54.45                                           | 0.401                                     |
| 2/0                | 323                  | 133                             | 70.01                                           | 0.455                                     |
| 4/0                | 532                  | 212                             | 108.91                                          | 0.567                                     |
| 250                | 627                  | 250                             | 127                                             | 0.615                                     |
| 350                | 888                  | 350                             | 177                                             | 0.725                                     |
| 500                | 1221                 | 500                             | 253                                             | 0.875                                     |
| 750                | 1850                 | 750                             | 380                                             | 1.127                                     |

# WHY SPECIFY CIR<sup>®</sup>-2 CABLES?

## The True Cable Cost Comparison

# LOWER TOTAL INSTALLED COST

### CIR-2 (TC-ER-HL) vs. Type CWCMC (MC-HL)

Based on 100 ft. of cable, 2 glands and installation labor (cable & glands)

16 AWG 1 Shielded Pair ..... CIR-2 Saves you **36%**

14 AWG 3/C+G ..... CIR-2 Saves you **37%**

6 AWG 3/C+G ..... CIR-2 Saves you **38%**

4 AWG 3/C+G ..... CIR-2 Saves you **33%**

2/0 4/C+G ..... CIR-2 Saves you **10%**

**Glands for CIR-2 Cables cost up to 50% LESS than those for Type MC**

1. Labor rate \$35.00/hr.
2. Labor time quotes based on long established Fluor Daniel Project Controls Standard Unit for Type TC and Type CWCMC cables for installation tray.
3. Identical installation for both products using a 100 ft. run basis.
4. Hawke A121 series glands used for CIR<sup>®</sup> cables and Hawke N701 glands used for Type CWCMC cables.
5. MRO pricing is used for cables and glands.



# CIR<sup>®</sup>-2

## TC-ER-HL CRUSH & IMPACT RESISTANT CABLES *WITHOUT EXTERNAL ARMORING* FOR OIL & GAS OPERATIONS



AmerCable is an ISO 9001 certified cable manufacturer that combines leading-edge manufacturing technology, innovative thinking, and high-quality service to deliver the finest upstream oil & gas cable products available.

AmerCable serves the world from our Oil & Gas Group headquarters in Houston, Texas. Our professional field engineers and sales force work with you to create innovative, cost effective project solutions.



*“Two things that contractors and engineers can’t stop raving about are the flexibility of the CIR cable and the easiness of prepping for terminations.”*



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