EDISONFLEX™
WIRE & CABLE

AN ILLUSTRATED LEARNING GUIDE

Wire & Cable 101

Power Cable Fundamentals

Construction, Manufacturing, Approvals and Applications



A Practical Guide to Power Cable Construction

Edition 1.5 / October 2026

An Edison Elm Brand

Explore the Guide

Discover what power cables are, how they are manufactured and why their construction matters. No electrical engineering background is required.

Pages	Topic	What It Covers
03-08	The Fundamentals	Electricity, cable layers, conductors, sizes and insulation
09-11	Electrical and Mechanical Layers	MV screens, concentric neutrals, shields, bonding and armour
12-18	How Cable Is Made	Materials, drawing, annealing, extrusion, assembly and testing
19-33	Cable Types and Applications	Illustrated uses for Canadian building wire and the EdisonFlex™ portfolio
34-42	Certification and the CEC	CSA and UL marks, certification, installation rules and cable ratings
43-47	Putting It Together	Selection, cable lengths, examples, self-check and glossary

How to Use This Guide

Read from the beginning for a step-by-step introduction, or use the contents to explore a particular topic. The diagrams explain cable layers and manufacturing processes; the examples connect those concepts to familiar applications.

What Is Inside

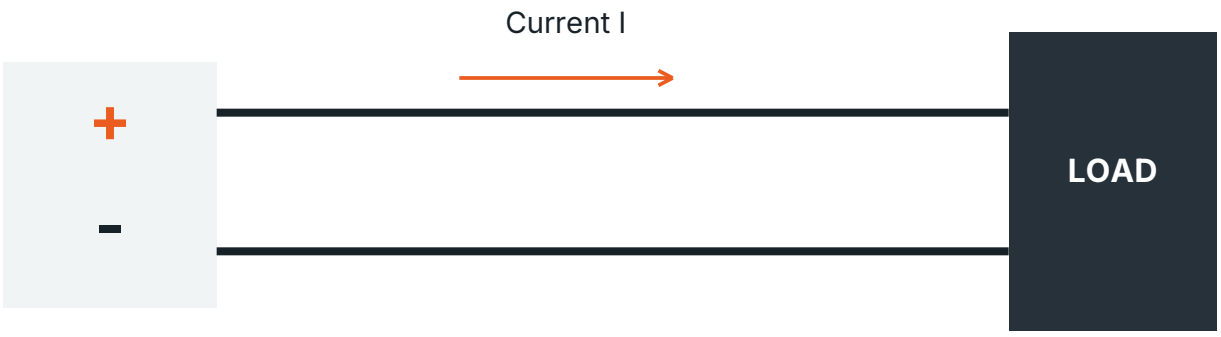
Explore how raw materials become cable, then follow each cable family into a real application. Learn how certification marks, product standards and the Canadian Electrical Code work together.

READING THE ILLUSTRATIONS

The diagrams simplify cable construction and manufacturing. Layer thicknesses, strand counts and colours are illustrative unless specifically labelled.

Electricity in a Cable

Voltage drives current through a complete circuit. The conductor has resistance, so some electrical energy becomes heat.



Voltage V

Potential Difference

Conductor Resistance R

Resistance Creates Heat and Voltage Drop

Closed Circuit / Simplified DC Illustration

Voltage, Current and Power

Voltage (V) is the potential difference. **Current (A)** is charge flow. **Power (W)** is the rate of energy transfer.

For a simple DC example, P = V × I. A 10 kW load at 500 V draws 20 A, ignoring losses.

Why Conductor Size Matters

Conductor losses follow I^2R. If current doubles and resistance stays constant, losses become four times greater.

Sizing considers current, temperature, voltage drop, fault duty and installation conditions. Voltage alone cannot determine conductor size.

REMEMBER

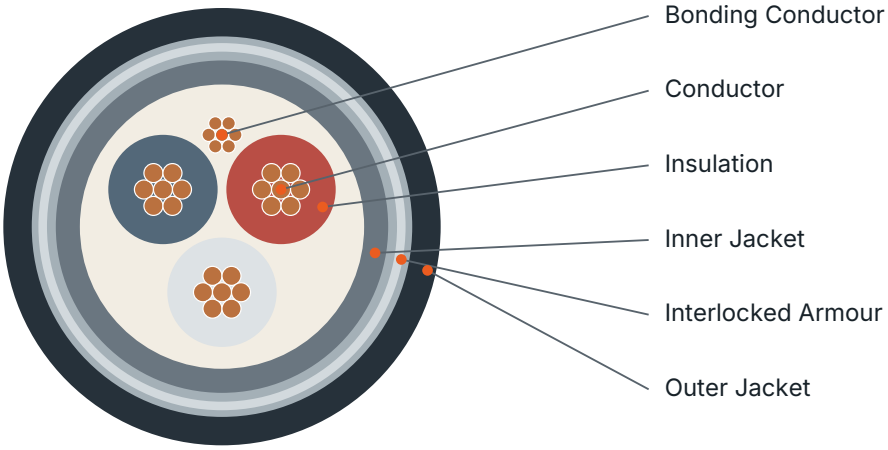
1 kV = 1,000 V. A cable voltage rating and the circuit's operating voltage are related, but they are different values.

Inside a Power Cable

See the same construction from the side and end. The side view reveals the spiral profile of interlocked armour.



EdisonFlex™ TECK90 | Representative Side View



End View: The Armour Appears as a Ring

The Electrical Core

The conductors carry current. Insulation separates them electrically. A bonding conductor connects exposed conductive parts to the protective bonding system.

The Protective Layers

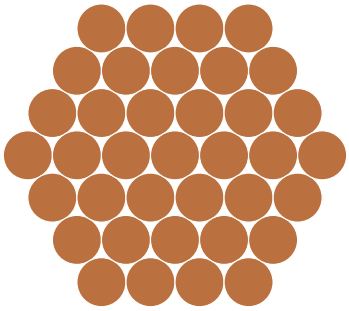
TECK90 includes an inner jacket, interlocked metal armour and an outer jacket. The side view shows the formed metal strip; the end view shows where that layer sits.

READ BOTH VIEWS

The EdisonFlex™ TECK90 image is representative. Colours, core count, armour metal and layer dimensions depend on the selected product.

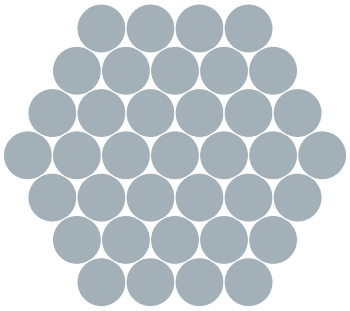
Copper and Aluminum

Both are established conductor materials. Their different electrical and mechanical properties affect the complete installed solution.



COPPER

More Conductivity Per Unit Area



ALUMINUM

Less Mass Per Unit Volume

Copper

Copper generally achieves a given resistance with less metal area. It is common in building circuits, industrial cable, flexible cord and telecom power.

Tinned copper is copper with a thin tin coating. It remains a copper conductor.

Aluminum

Aluminum is commonly chosen for lower conductor cost and lighter weight, especially in large feeders, renewable energy, MV and overhead applications.

For the same required ampacity, aluminum generally needs a larger cross-sectional area than copper. An ampacity study or applicable code tables determine the AWG/kcmil size; the increase is not a fixed one-gauge step.

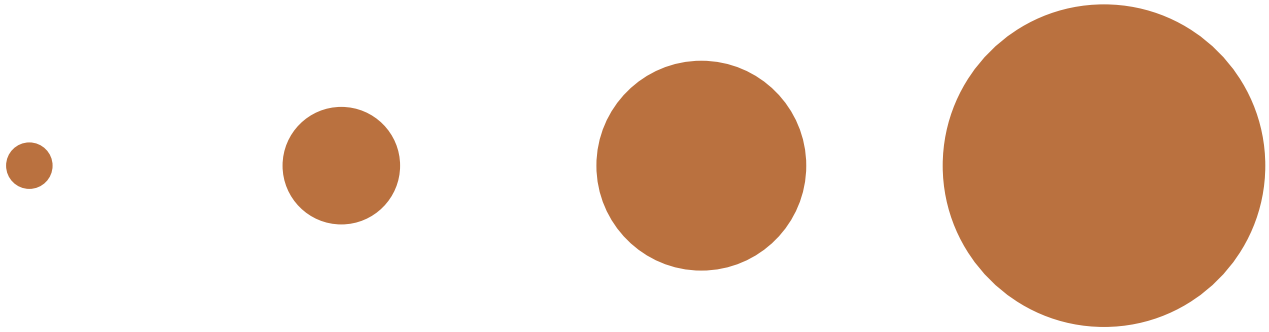
COMPARE THE WHOLE SOLUTION

Check voltage drop, fault-current duty, cable dimensions and aluminum-compatible terminations as well as ampacity. Follow the connector manufacturer's preparation and installation instructions.

Understanding Cable Size

Size normally describes conductor metal area. AWG, MCM and kcmil are size designations, not the outside diameter of an insulated cable.

MCM = KCMIL



10 AWG	2 AWG	4/0 AWG	500 kcmil
5.3 mm²	33.6 mm²	107.2 mm²	253.4 mm²

Nominal metal areas drawn to a common scale

AWG and kcmil

Within numbered AWG sizes, a smaller number means a larger conductor: 10 AWG is larger than 12 AWG.

After 1 AWG, sizes progress through 1/0, 2/0, 3/0 and 4/0. Larger conductors commonly use kcmil.

MCM = KCMIL

MCM and KCMIL (usually written kcmil) name the same conductor-area unit: one thousand circular mils.

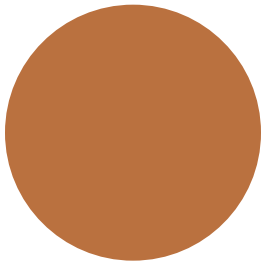
500 MCM = 500 kcmil, approximately 253.4 mm². Neither name describes the overall cable diameter.

SAME UNIT, DIFFERENT NOTATION

You may see 250 MCM on a quotation and 250 kcmil on a datasheet. The area is the same; still match metal, stranding and the complete cable construction.

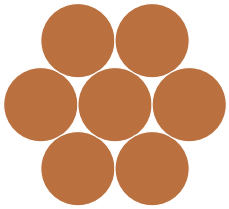
Solid and Stranded Conductors

Stranding assembles individual wires into one conductor. Strand construction affects flexibility, diameter and connector fit.



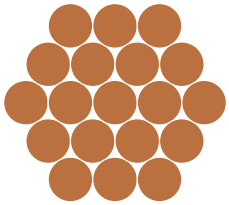
Solid

One Wire



7 Strands

Concentric Example



19 Strands

Concentric Example

Schematics show strand arrangements, not exact dimensional equivalence.

Several Ways to Build a Conductor

Concentric stranding uses organised layers. **Compressed** and **compact** constructions reduce spaces within the conductor.

Fine-stranded and rope constructions can improve flexibility for suitable applications.

The Questions to Ask

Confirm conductor size, metal and strand construction separately. More strands do not automatically mean greater ampacity.

A flexible cable is not necessarily rated for continuous flexing. The lugs and connectors must accept the conductor construction.

DESCRIBE IT ACCURATELY

“10 AWG, 19-strand copper” identifies size, strand count and metal. It still needs cable type, voltage and other product details.

Insulation and Voltage Rating

Insulation keeps energized conductors electrically separated. Its material, thickness and quality are central to the cable's voltage rating.

Higher Voltage Generally Requires Thicker Insulation

Within Otherwise Comparable Cable Designs



Thinner Insulation Wall | **Thicker Insulation Wall**

Conductor | Insulation

Same conductor size and insulation material; jacket and screens omitted.

Common Material Names

PVC: polyvinyl chloride.
PE: polyethylene.
XLPE: crosslinked polyethylene.
TR-XLPE: tree-retardant XLPE.
EPR: ethylene propylene rubber.
Nylon: a polyamide covering used on certain building wires.

Thickness and Voltage Rating

Voltage creates electrical stress across the insulation. For comparable designs, higher voltage generally requires a thicker insulation wall.

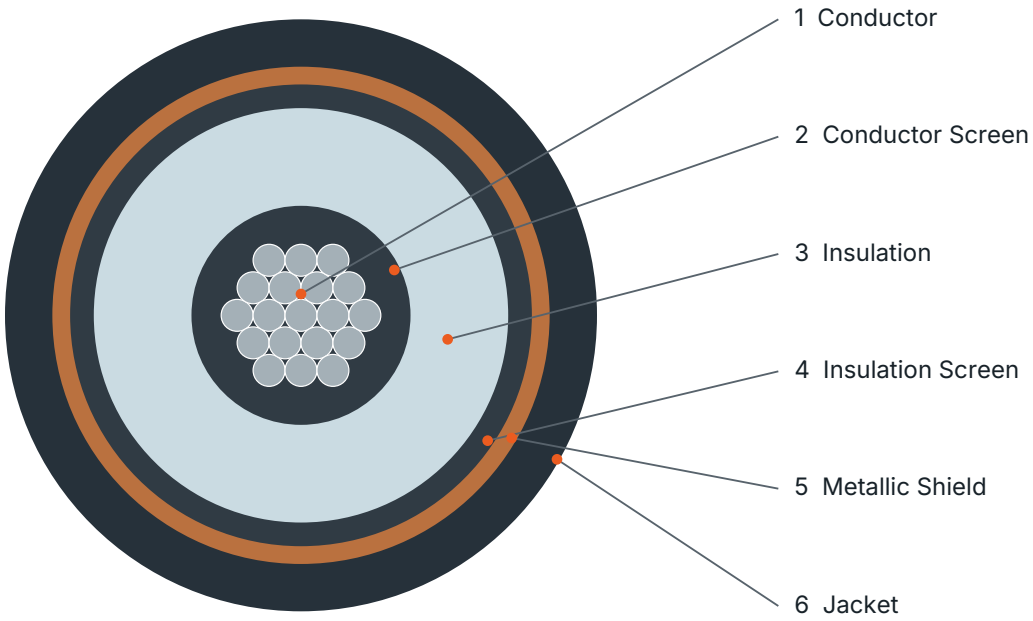
Material properties, geometry, manufacturing quality and testing also determine the rating. Use the cable's marked voltage rating. The outer jacket protects the cable; its thickness is separate from insulation thickness.

A USEFUL DISTINCTION

A thermoplastic can soften on heating. A crosslinked polymer resists flow and cannot simply be remelted as an ordinary thermoplastic.

The Shielded MV Insulation System

Medium-voltage constructions use controlled interfaces around the insulation to manage electrical stress.



Tape-Shielded MV Cable

The Insulation Interfaces

The **conductor screen** forms a smooth electrical interface over the conductor. The **insulation** provides the main dielectric barrier. The **insulation screen** surrounds that barrier.

The screens are semiconductive layers.

The Metallic Layer and Jacket

A **metallic shield** or **concentric neutral** is a separate component. Its construction, electrical duty and bonding arrangement must suit the system.

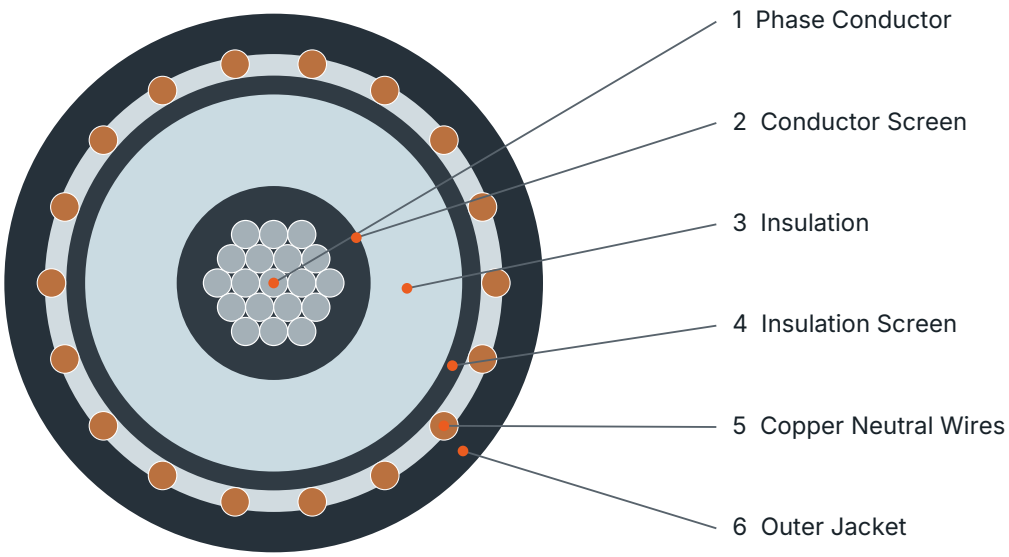
The jacket provides the specified protection. Armoured MV designs add further mechanical layers.

DO NOT SKIP THE DISTINCTION

Semiconductive screens and the metallic shield have different roles. The word “shield” should be read in its construction context.

Concentric-Neutral MV Cable

A concentric neutral (CN) uses copper wires arranged around the insulated phase conductor, beneath the outer jacket.





Side-View Schematic

The Copper Wires Spiral Along the Cable

What the Wires Do

The wires form the metallic shielding and the specified neutral/ground-fault return path in the designed system. They surround the insulation screen and are applied helically along the cable. CN is a common construction for utility distribution and renewable-energy collection.

Reading FULL, 1/3 or 1/6 CN

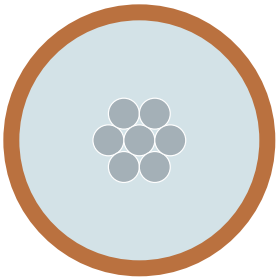
FULL identifies a full neutral; 1/3 and 1/6 identify reduced neutrals. The fraction describes neutral capacity relative to the phase conductor under the specified design basis, not the number of wires. Confirm copper-wire count/AWG, resistance, fault-current duty and grounding. Copper tape is not an automatic substitute.

ORDERING CHECKPOINT

Specify the required CN designation and confirm the actual copper-wire construction. A reduced neutral must suit the system's electrical requirements.

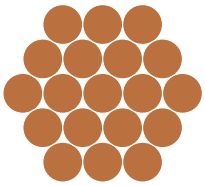
Shield, Bond and Armour

These components may all contain metal, but they perform different jobs and require different design checks.



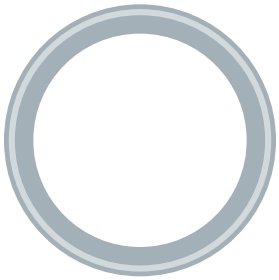
SHIELD

Electrical Function



BOND

Protective Connection



ARMOUR

Mechanical Protection

Shared metal appearance does not mean shared function.

Electrical Duties

A power-cable **metallic shield** works with the insulation system and its grounding/bonding design.

A **bonding conductor** connects exposed conductive parts to the protective bonding system. A **neutral** has a defined circuit function and may carry normal current.

Mechanical Duties

Interlocked armour uses formed metal strip to protect the core. An outer jacket can add environmental protection.

Do not assume armour replaces a specified bonding conductor, or that a tape shield can replace concentric-neutral wires.

CHECK THE ACTUAL DESIGN

Metallic-layer size, continuity, fault duty and termination details are separate from the phase-conductor size.

How Cable Is Made

Follow the material as it becomes a finished cable. Some products skip steps, and the order depends on the construction.

01	**Raw Materials**	Copper (Cu), typically 8 mm rod, or aluminum (Al), commonly 9.5 mm rod; polymer compounds, strip, tapes, fillers and bonding wire.
02	**Drawing**	Draw Cu or Al rod through smaller dies to form wire for a solid AWG size or the strands of an AWG/kcmil conductor.
03	**Annealing**	Apply controlled heat, when needed, to reach the required softness and temper.
04	**Stranding**	Combine individual Cu or Al wires; their total metal area forms the specified AWG/kcmil conductor size.
05	**Extrusion & Curing**	Form insulation around the conductor; crosslink the compound where required.
06	**Shielding / Neutral**	Add metallic tape or concentric-neutral wires to the appropriate MV core.
07	**Cabling / Lay-Up**	Assemble insulated cores, bond and fillers when the cable is multicore.
08	**Armouring & Jacketing**	Form interlocking strip around the assembly; apply the specified outer jacket.
09	**Testing & Reeling**	Complete required tests, identification, length measurement and reel records.

FOLLOW THE CONSTRUCTION

The next six pages explain these operations. Shielding, cabling and protective layers occur in the sequence required by the cable design.

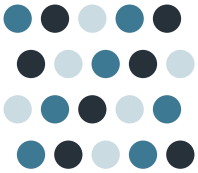
Start with the Raw Materials

The bill of materials determines what enters production. A cable plant may buy rod, finished wire, prepared conductor and ready-to-use polymer compounds.



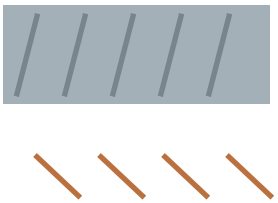
Conducting Metals

Copper and Aluminum



Polymer Compounds

Insulation and Jackets



Protection Materials

Metal Strip, Tapes and Fillers

Material	Typical Form	What It Becomes
Copper (Cu) or Aluminum (Al)	Typically 8 mm Cu rod or 9.5 mm Al rod; also wire or prepared conductor	Current-carrying conductor; copper can also become a bond or CN wire.
Insulation Compounds	Prepared polymer pellets or granules, depending on the material	The electrical barrier: examples include XLPE, EPR and PVC systems.
Jacket Compounds	PVC, PE or other specified protective compounds	Inner bedding/jacket or outer environmental protection.
Strip, Tape and Fillers	Metal strip; shield tapes; yarns, binders and water-blocking materials	Armour, shielding, shape control and other specified cable features.

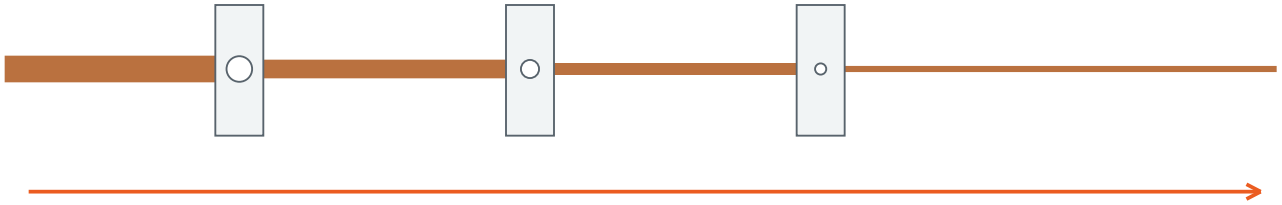
COMPOUNDING

A compound combines the base polymer with selected additives. Formulation affects processing, flexibility, ageing, flame behaviour and other properties. The chemical name alone does not establish the cable rating.

Drawing and Annealing

Drawing changes wire dimensions. Annealing changes the metal's mechanical condition. They are separate operations.

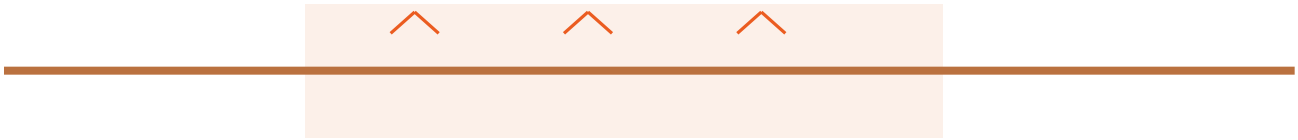
01 Drawing



Cu / Al Rod — Successively Smaller Dies — Smaller Wire

Typical: Cu 8 mm / Al 9.5 mm — Solid Conductor or Individual Strand

02 Annealing, Where Required



Controlled Heat Treatment

Drawing: Make the Wire Smaller

Common starting rod diameters are **8 mm for copper (Cu)** and **9.5 mm for aluminum (Al)**; supplier and process choices vary. Dies progressively reduce the diameter and lengthen the wire. The final wire may be a solid AWG conductor or one strand in an AWG/kcmil conductor. Lubrication controls friction and heat; drawing generally hardens the metal.

Annealing: Control the Temper

Controlled heating and cooling adjust the metal's structure, restoring ductility where required. The route may use an in-line annealer or a batch furnace. Copper and aluminum alloys can need different routes; not every conductor is fully annealed. The required alloy and temper determine the process.

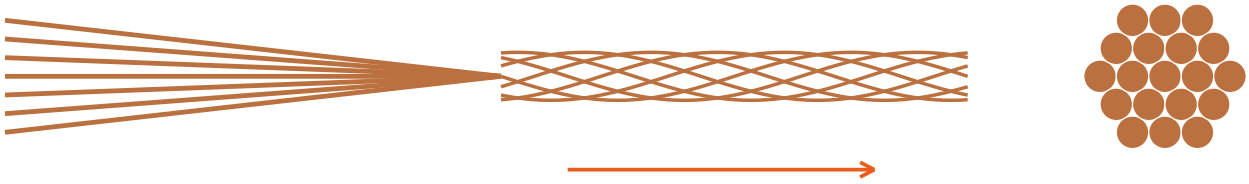
WHAT TO REMEMBER

For solid wire, drawing sets the conductor size. For stranded conductors, the combined metal area of the wires sets the AWG/kcmil size. Annealing controls softness and ductility.

Stranding and Cabling

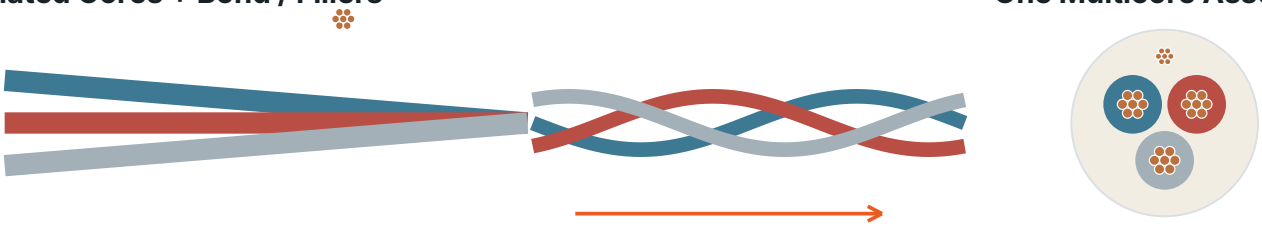
Both operations bring parts together, but they work at different levels of the construction.

Individual Metal Wires **One Stranded Conductor**



STRANDING

Insulated Cores + Bond / Fillers **One Multicore Assembly**



CABLING / LAY-UP

Stranding: Wires into a Conductor

Wire pay-offs feed a stranding machine, which lays wires around one another at a controlled pitch. The strand number, wire diameter and lay produce the required conductor. Compression or compaction can reduce voids and overall diameter.

Cabling: Cores into a Cable

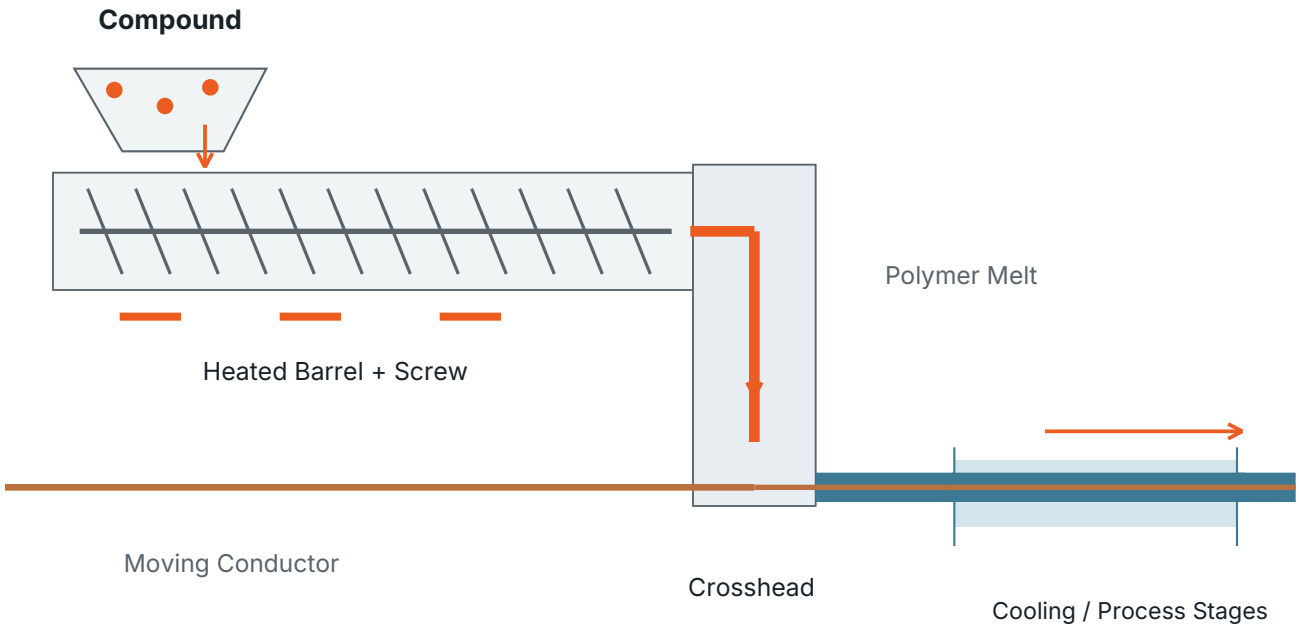
A cabling or lay-up machine brings insulated conductors together with any required bond, fillers and binders. The controlled lay holds the assembly's shape and supports flexibility. A single-conductor RW90 product does not need a multicore lay-up step.

RECOGNISING THE DIFFERENCE

Within one stranded conductor, individual metal wires are laid together. Within a multicore cable, several insulated conductors form the assembly. These are two different stages of manufacture.

Extrusion: Applying the Polymer

An extrusion line continuously forms a controlled layer of polymer around a moving conductor or cable core.



1 Feed

Compound enters the hopper.

2 Heat & Convey

The screw moves and pressurises the compound.

3 Shape

The head and die apply the layer.

4 Set / Cure

Cool and complete any required cure.

What Controls the Layer

Tooling, compound temperature, pressure and line speed affect thickness, centring and surface finish. A crosshead guides the wire through the melt stream; the die defines the outside shape. Cooling stabilises the layer.

When Crosslinking Is Needed

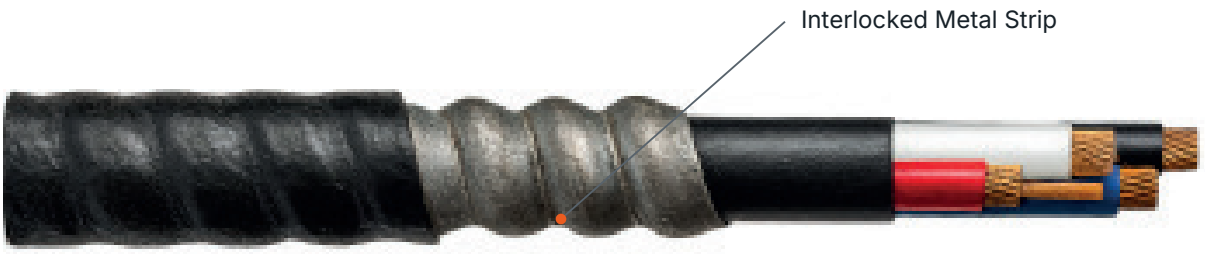
Thermoplastic layers set as they cool. Crosslinkable insulation needs its specified curing route, such as peroxide heat curing, moisture/silane curing or irradiation. Heating in the extruder alone does not prove complete crosslinking.

MV DETAIL

Shielded MV designs may co-extrude the conductor screen, insulation and insulation screen. Clean materials and controlled interfaces are especially important.

Armouring, Jacketing and Finishing

Mechanical protection is built around the electrical core. TECK90 is a useful example because its inner and outer jackets have different positions.



EdisonFlex™ TECK90 | Actual Product Artwork

1 → **2** → **3**

Inner Jacket

Separates the core from armour

Interlocked Armour

Formed strip wraps the core

Outer Jacket

Covers the metal layer

How Interlocked Armour Is Made

A forming head shapes metal strip and winds it helically around the moving core. Adjacent strip edges interlock to form a flexible protective covering. Strip profile, lay and fit matter. Aluminum interlocked armour is often abbreviated AIA.

How the Cable Is Finished

The required outer jacket is extruded over the assembly. Its compound provides the specified environmental protection. Marking identifies type and ratings; length measurement, end protection, testing and reel records complete the product. Marking and curing order varies by product.

SEE THE DIFFERENCE

Armour is a formed metal layer, not a smooth tube. The inner jacket separates it from the core; the outer jacket covers it in a TECK90 construction.

Quality and Traceability

Different checks answer different questions. A certificate, a production test report and a reel label each have a role.

1

Design

Does the construction meet its standard?

2

Production

Were materials and processes controlled?

3

Reel

Can the delivered cable be traced?

Certificate + Production Evidence + Correct Identification

What Is Checked

Typical controls address input materials, conductor resistance, layer dimensions and required electrical or physical tests.

MV products can have additional electrical tests. The applicable standard and product design determine the test programme.

What Evidence Proves

Design qualification establishes evaluated construction performance. Production checks address the material actually made.

A reel or lot identifier connects supplied cable to its records. Use the product's actual acceptance limits; avoid universal percentage tolerances.

RECEIVING QUESTION

Can you match this reel's type, size, voltage, length and lot identity to the purchase order and supporting documents?

Find the Cable in the Application

Use this map to connect EdisonFlex™ cable families with real installation settings. The following pages show where the cable sits and why its construction matters.

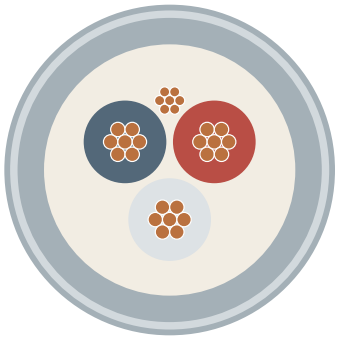
Application	Cable Families	Pages
Homes and Outbuildings	NMD90 / NMWU	21
Thermoplastic Building Wire	T90 Nylon / TWN75; TW / TW75 / TWU / TWU75	22-23
XLPE Building Wire	RW90 / RWU90	24
Armoured Building and Industrial Power	AC90 / ACWU90 / TECK90 / ACG90 / ACGWU90	20, 25-26
Solar DC and AC Circuits	RPVU90; feeders and MV collection	27
Medium-Voltage Distribution	MV TR-XLPE concentric neutral; tape shield; armoured MV / HVTECK examples	28-29
Telecom Power	L2 / L3 / L4	30
Industrial Control and Tray	TC / CIC-TC	31
Portable Equipment and Mining	SOOW / SJOOW / SHD-GC	32
Grounding and Overhead Lines	Bare Copper / AAC / ACSR	33

HOW TO READ THE EXAMPLES

Application drawings show the role of the cable. Final size, voltage, certification, fittings and installation details must match the actual circuit and adopted code.

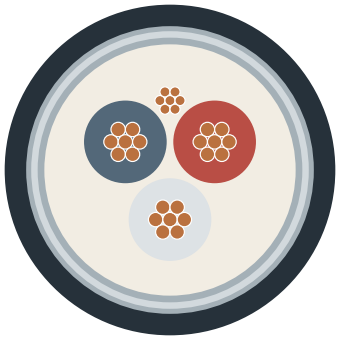
Three Armoured Constructions

The layers explain the application. These simplified cross-sections show the differences to look for.



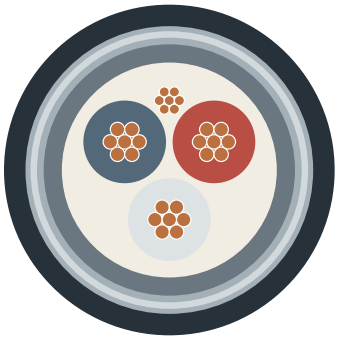
AC90

Armour



ACWU90

Armour + Outer Jacket



TECK90

Inner Jacket + Armour + Outer Jacket

Family	Recognizable Construction	Selection Checkpoint
AC90	Insulated cores + bond + armour	Location and mechanical protection
ACWU90	Armoured core + outer jacket	Wet-location and burial rating
TECK90	Inner jacket + armour + outer jacket	Industrial environment and exact listing

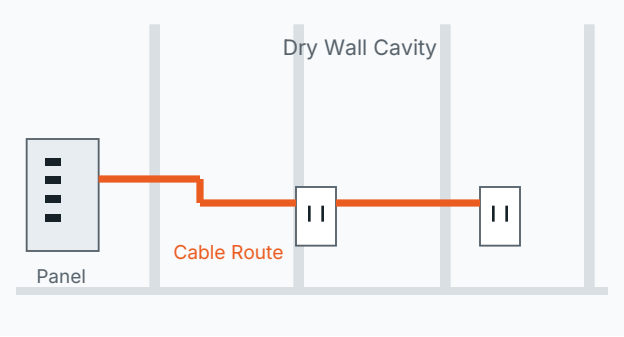
LOOK INSIDE

The inner jacket is a key TECK90 construction feature. Armour, shielding and bonding still serve different electrical or mechanical functions.

Homes and Outbuildings

A dry wall cavity and a buried outdoor route need different cable constructions, even when both circuits serve the same property.

NMD90 | Wiring Inside a Home



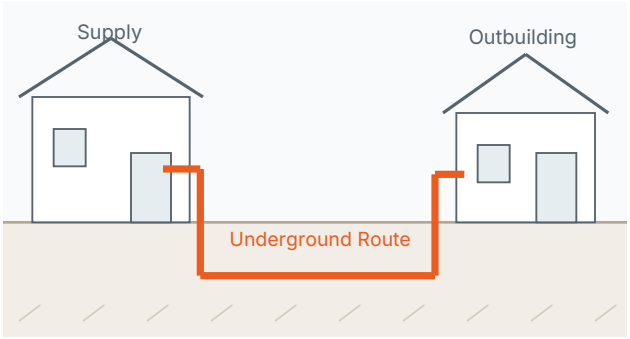


Example. A branch circuit runs from a distribution panel through dry wall framing to receptacles or lighting.

Why It Fits. Insulated circuit conductors and a bonding conductor are assembled in a nonmetallic sheath. The EdisonFlex™ example is rated 300 V.

Check. Building construction, physical protection, supports, box entries and circuit loading. A dry indoor route does not establish outdoor or burial suitability.

NMWU | A Buried Route to an Outbuilding





Example. A suitably rated underground circuit supplies a detached garage or garden building.

Why It Fits. The wet/underground cable construction suits exposure that differs from an indoor wall cavity. EdisonFlex™ NMWU examples are rated 300 V.

Check. Direct-burial certification, cover and protection, voltage drop, terminations and the bonding/grounding arrangement at the destination.

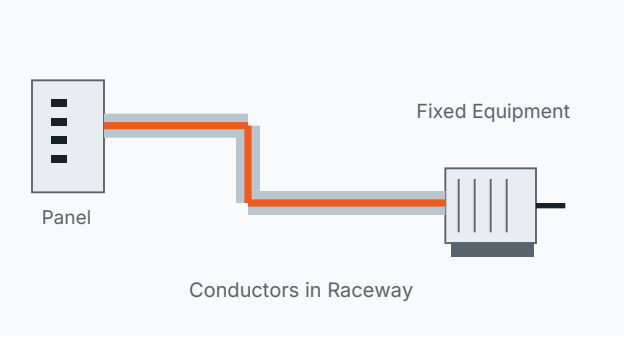
CONNECT THE CONSTRUCTION TO THE JOB

A sheath colour is not an installation approval. Read the NMD90 or NMWU type marking and the actual voltage rating.

T90 Nylon and TWN75

These PVC-insulated, nylon-covered conductors are commonly pulled through raceways. One conductor may carry both type designations.

T90 Nylon | Dry Indoor Raceways



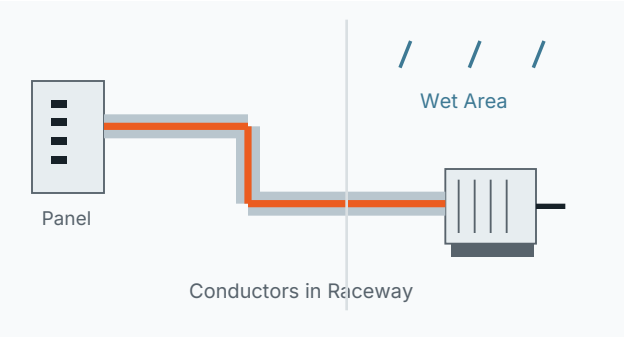


Example. Individual conductors run through conduit from a panel to commercial lighting or equipment.

Why It Fits. The PVC provides electrical insulation; the nylon covering protects its surface. T90 identifies the 90°C dry-location rating; the portfolio example is 600 V.

Check. Raceway fill, pulling limits and terminal temperature. A 90°C insulation rating does not automatically permit 90°C terminations.

TWN75 | Wet-Location Raceway Conductors





Example. A raceway route includes a wet location and uses conductors bearing the TWN75 marking.

Why It Fits. TWN75 provides the wet-location designation with a 75°C rating. Read each rating on a dual-marked T90 Nylon/TWN75 product.

Check. The exact wet-location marking and other exposures. Wet-rated insulation alone does not establish direct-burial or sunlight suitability.

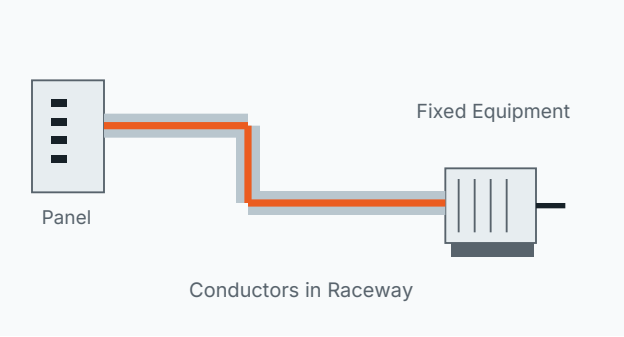
CONNECT THE CONSTRUCTION TO THE JOB

Canadian type designations and U.S. designations such as THHN or THWN-2 have their own conditions. Dual markings must actually appear in the certified product scope.

The TW and TWU Families

These are thermoplastic building-wire types. The underground designation and temperature class change which product fits the route.

TW / TW75 | General Building Circuits





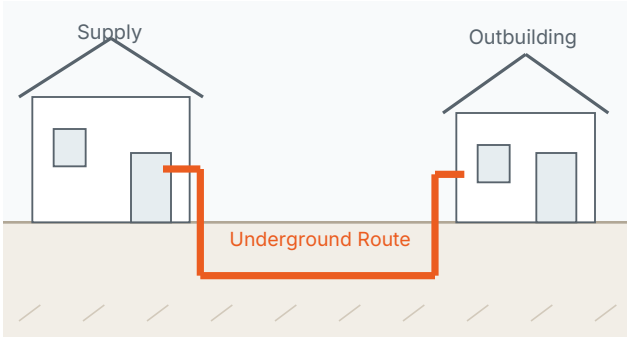
Green Example: Bonding Conductor

Example. PVC-insulated conductors supply fixed equipment through an approved raceway.

Why It Fits. TW is the 60°C family; TW75 is the 75°C family. These wet-location thermoplastic types are commonly used where their temperature and installation conditions fit.

Check. The exact type, 600 V portfolio rating, terminal limits and ampacity. Select the required temperature class rather than treating all PVC wire alike.

TWU / TWU75 | Underground Applications





Green Example: Bonding Conductor

Example. An underground circuit uses an appropriately marked underground thermoplastic conductor.

Why It Fits. The U designation identifies the underground type. TWU and TWU75 have 60°C and 75°C temperature classes respectively.

Check. Direct-burial conditions for the selected cable, soil protection, depth, route, splices and end connections. Check the actual product listing.

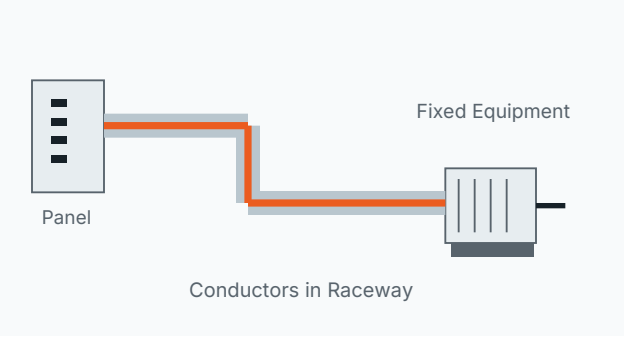
CONNECT THE CONSTRUCTION TO THE JOB

The cable type, temperature rating and permitted wiring method work together. A familiar material name such as PVC does not answer all three questions.

RW90 and RWU90

XLPE-insulated single conductors serve everything from building feeders to large energy projects. The route determines which type is appropriate.

RW90 | Feeder Conductors in Raceway



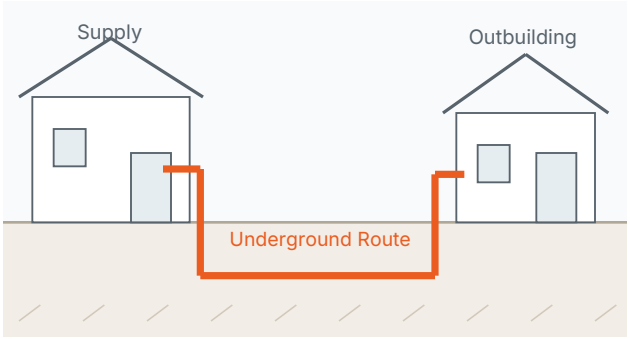


Example. Copper or aluminum conductors connect distribution equipment through a raceway, including a feeder in a BESS installation.

Why It Fits. XLPE supplies thermoset insulation. EdisonFlex™ RW90 examples have 600, 1000 or 2000 V ratings; select the actual voltage and certified construction.

Check. Wet-location requirements, ampacity, voltage drop, grouping, conductor material and terminal ratings. Conduit and cable-tray permissions are separate checks.

RWU90 | Underground Feeders





Example. A feeder crosses an outdoor site using underground-rated single conductors.

Why It Fits. RWU90 adds the underground application designation. The EdisonFlex™ RWU90 example in this guide is rated 1000 V.

Check. The exact burial/raceway conditions, cover, mechanical protection and conductor arrangement. Check the project design before choosing conductor size.

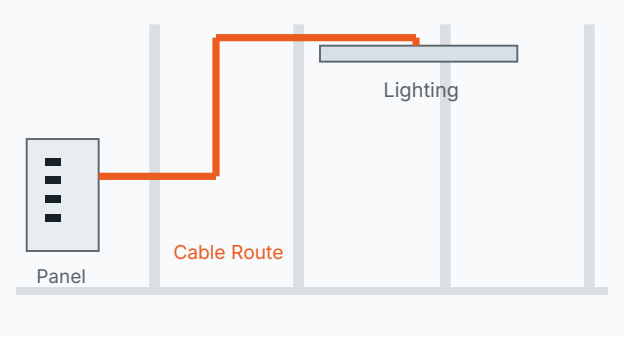
CONNECT THE CONSTRUCTION TO THE JOB

RW90 and RWU90 are distinct type designations. A higher marked voltage does not by itself give RW90 the underground permissions of RWU90.

AC90 and ACWU90

Both use interlocked armour. The outer jacket on ACWU90 changes its environmental protection and the installation possibilities.

AC90 | Commercial Interior Circuits



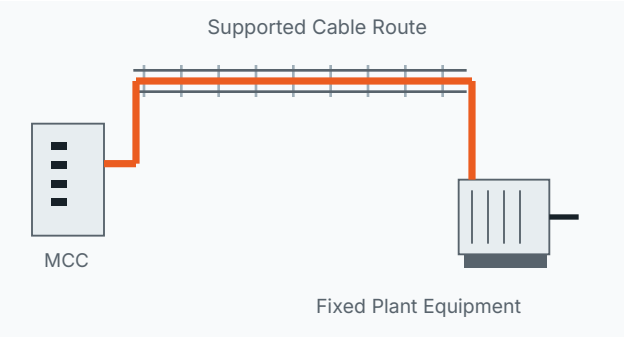


Example. Armoured cable supplies lighting and receptacles in a dry commercial interior.

Why It Fits. Insulated conductors and bonding provision are protected by interlocked metal armour. A common EdisonFlex™ building-power example is 600 V.

Check. Approved connectors, supports, bonding continuity and exposure to damage. Check the permitted location; bare armour is not a weather jacket.

ACWU90 | Outdoor or Underground Feeders





Example. A jacketed armoured feeder supplies outdoor equipment or follows a permitted buried route.

Why It Fits. The outer jacket adds environmental protection around the armour. The standard EdisonFlex™ example is 600 V.

Check. Wet-location and direct-burial markings, compatible fittings, route protection and conductor sizing. Hazardous-location suitability needs the complete approved system.

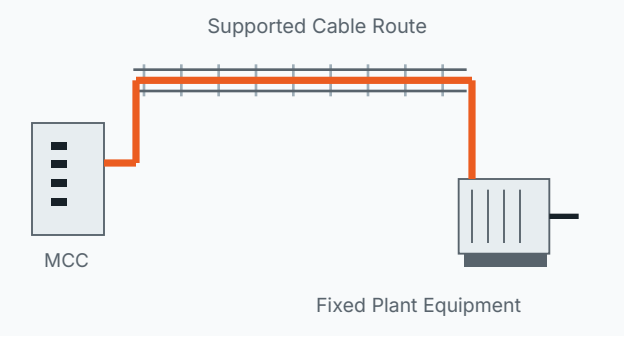
CONNECT THE CONSTRUCTION TO THE JOB

A cable connector has to fit the cable construction and its environment. The correct cable with an unsuitable termination is an incomplete installation.

Industrial Armour and Bonding

Armour protects the assembly. The complete bonding arrangement and connector design determine how exposed metal is connected to the protective path.

TECK90 | Plant Equipment and Feeders



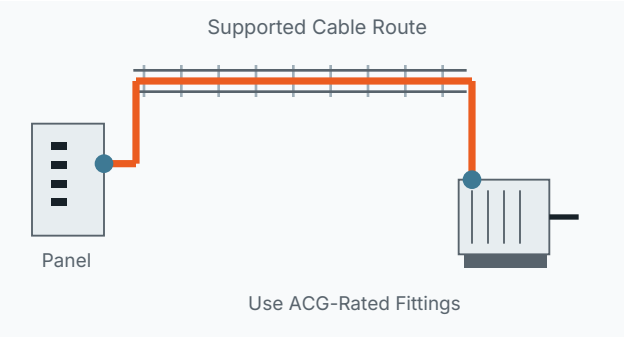


Example. A feeder runs from a motor-control centre along an industrial route to a pump or other fixed equipment.

Why It Fits. An inner jacket, interlocked armour and outer jacket protect the insulated core. EdisonFlex™ examples include 600 and 1000 V constructions.

Check. Cable supports, environment, bend radius, gland selection and bonding. Classified locations require the applicable cable, seals and fittings.

ACG90 / ACGWU90 | Armoured Power Circuits





Example. An armoured branch circuit uses a construction with a bare aluminum bonding conductor in contact with the armour.

Why It Fits. These types carry circuit conductors as well as providing a defined bonding system. ACG90 is unjacketed; ACGWU90 has an overall jacket.

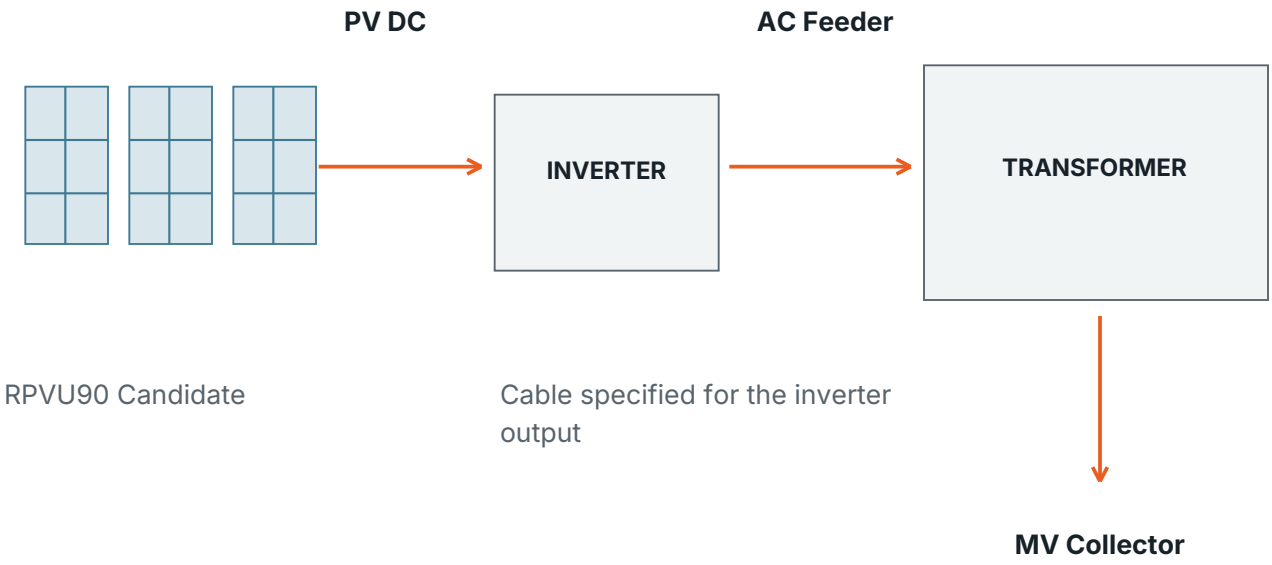
Check. Fittings specifically suitable for ACG cable and the location. Follow the cable/connector termination instructions; do not treat the armour connection as incidental.

CONNECT THE CONSTRUCTION TO THE JOB

ACG90 and ACGWU90 describe an armoured cable bonding construction. They are not simply names for a separate earth wire.

Solar: Follow the Power

One solar installation can contain several cable families. The circuit changes as power moves through the site.



Representative Solar Power Path

Before the Inverter

PV circuits carry DC. EdisonFlex™ RPVU90 examples include 2000 V constructions. Check system maximum voltage, conductor size, connector compatibility, sunlight exposure, temperature and routing.

After the Inverter

AC feeders connect equipment; transformers raise voltage for collection. Industrial power or shielded MV cable may be needed. A PV cable rating does not automatically qualify a cable for every feeder on the site.

IDENTIFY THE CIRCUIT

A solar project can contain PV string circuits, AC feeders and MV collectors. Identify which part of the system the cable serves before comparing constructions and ratings.

Medium-Voltage Power

EdisonFlex™ medium-voltage cable examples span 5 to 46 kV. Each voltage class has its own construction and certification requirements.

100%

System-Specific Category

133%

System-Specific Category

173%

System-Specific Category

Voltage Class	Insulation Level	Temperature
25 kV	133%	As Certified

Read the Complete Description

A useful example is 3/C 350 kcmil aluminum, 25 kV, 133% insulation level, TRXLPE, copper tape shield, aluminum interlocked armour and PVC jacket. Each field tells you something different.

Specify the System Conditions

Insulation level relates to system grounding and the duration of ground faults. It is not permission to operate at 133% of the cable's voltage class. Confirm the level with the system designer, along with shield and bonding requirements.

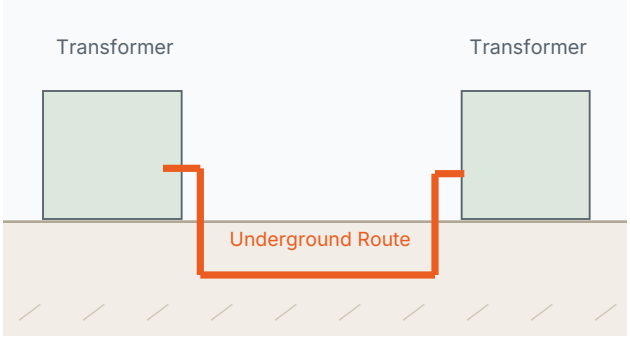
TEMPERATURE IS SEPARATE

Voltage class, insulation level and operating temperature are different ratings. Confirm any MV105 claim against the exact certified product.

Medium Voltage at Work

Shield design, armour and installation method change as a medium-voltage circuit moves from a collection system into a facility.

Concentric-Neutral MV | Site Collection



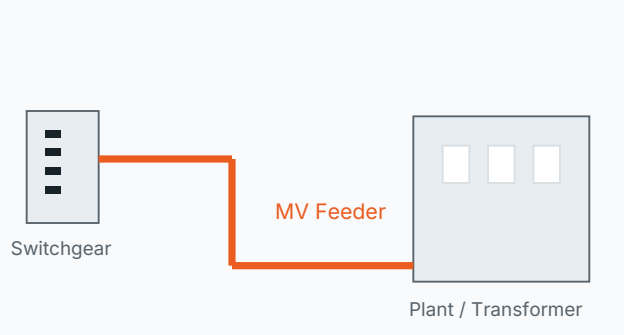


Example. A buried collector links pad-mounted transformers on a solar, wind or industrial site.

Why It Fits. The insulated phase conductor carries power. Helical copper neutral wires surround its screened insulation; full or reduced neutral designs serve specified system duties.

Check. Voltage class, insulation level, neutral sizing, soil thermal conditions and fault duty. Grounding and screen/neutral bonding are engineered as a system.

Tape-Shielded / Armoured MV | Plant Feeders



Tape Shield + Optional Armour

Example. A medium-voltage feeder connects switchgear, transformers or large equipment. A protected raceway may use unarmoured cable; an HVTECK construction adds armour.

Why It Fits. Metallic tape provides shielding. Armour provides mechanical protection. Neither replaces the insulation or its semiconductive screens.

Check. The exact cable construction, rated voltage, shield fault capacity, terminations and approvals. Confirm any 105°C claim on the certified product.

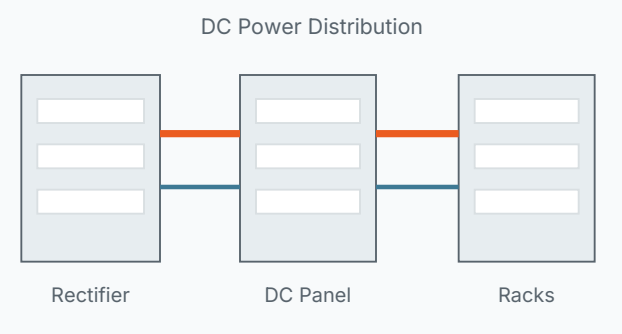
CONNECT THE CONSTRUCTION TO THE JOB

EdisonFlex™ MV examples span 5-46 kV. A voltage range for the family does not mean every construction, size or insulation system is certified at every voltage.

Telecom Power: L2, L3 and L4

These cables distribute power inside telecom facilities. The L2/L3/L4 designations describe construction levels, not different circuit voltages.

L2 | DC Distribution to Equipment



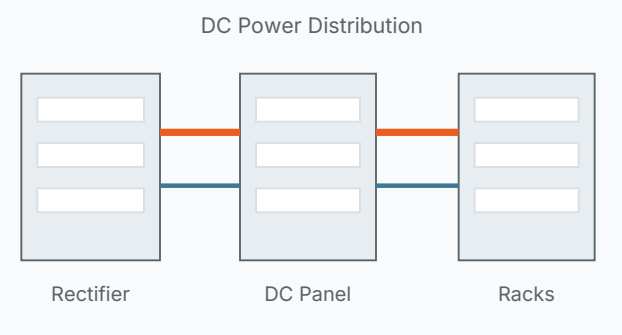


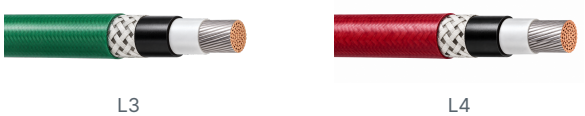
Example. A telecom DC power plant supplies distribution panels and equipment racks; a nominal -48 V system is a familiar example.

Why It Fits. Tinned copper and limited-smoke, non-halogenated insulation support telecom power installations. The EdisonFlex™ cable example is rated 600 V AC/DC.

Check. Equipment and installation approval, flame/smoke requirements, polarity, terminations and supported routing. Cable voltage rating differs from actual system voltage.

L3 / L4 | Braided Telecom Constructions





L3 L4

Example. The same power-distribution role requires a braided construction specified by the facility or equipment system.

Why It Fits. L3 adds braid; L4 uses the heavier-duty braided construction described in the portfolio. The level must match the required cable specification.

Check. The exact L3 or L4 design, flexibility and termination method. Where an AWM marking is used, verify its equipment-use conditions and any separate field-wiring approval.

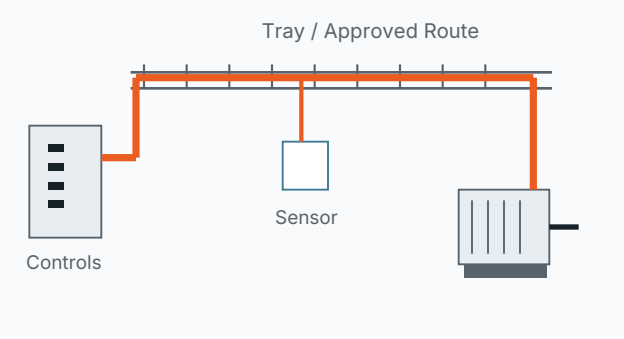
CONNECT THE CONSTRUCTION TO THE JOB

Telecom power cable is not data cable. Its job is to deliver electrical power to the equipment that handles the data.

Tray and Industrial Control Cable

Industrial equipment often needs several power and control circuits along the same route. Cable markings determine which wiring methods are permitted.

TC | A Supported Cable-Tray Route



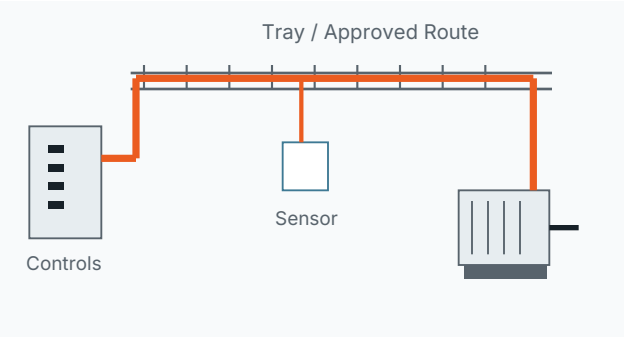


Example. A tray route carries suitable multiconductor cables between a control panel and fixed equipment.

Why It Fits. TC identifies a tray-cable construction. The EdisonFlex™ portfolio example is 600 V with an overall protective jacket.

Check. Canadian certification, tray suitability, conductor count, circuit separation, support and environment. TC does not automatically mean exposed-run permission.

CIC-TC | Control and Instrumentation





Example. A process skid uses multiconductor cable between its control cabinet and field devices.

Why It Fits. CIC-TC combines control/instrumentation and tray designations. The complete marking identifies the installation permissions of the selected construction.

Check. Signal/power requirements, shielding where needed, routing and termination space. A CIC-only product does not automatically have the same tray permissions.

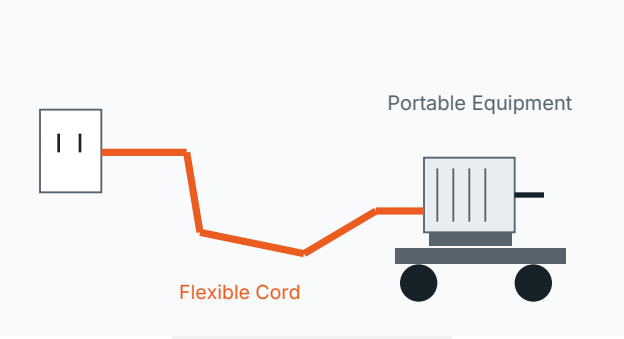
CONNECT THE CONSTRUCTION TO THE JOB

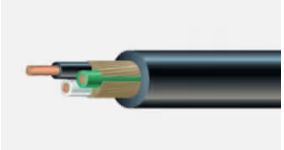
A jacketed industrial cable is not automatically a tray cable. Identify the type marking first, then check the wiring method and conditions of use.

Portable Power and Mining

Movement creates requirements that fixed building feeders do not face. A portable cord and a shielded mining cable serve very different duties.

SOOW / SJOOW | Portable Equipment



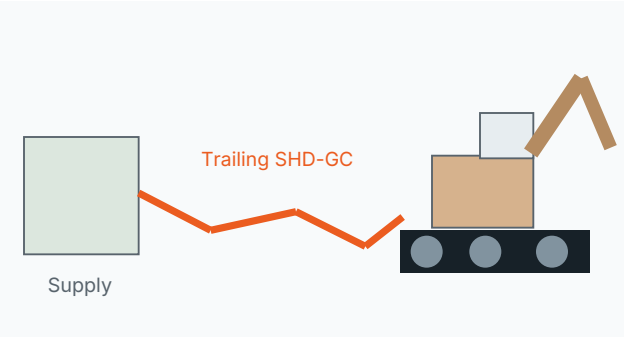


Example. A flexible cord supplies a portable pump, tool or temporary piece of equipment.

Why It Fits. SOOW is the 600 V extra-hard-usage type; SJOOW is the 300 V junior hard-usage type. OO denotes oil-resistant insulation and jacket; W denotes weather/water resistance under the standard.

Check. Plug and equipment ratings, strain relief, temperature, conductor count and movement. Flexible cord is not a general replacement for fixed building wiring.

SHD-GC | Mobile Mining Equipment





Example. A trailing power cable connects a mobile mining machine to its power supply.

Why It Fits. Shielded phase conductors, grounding conductors and a ground-check conductor support the power and protective monitoring system. Portfolio examples include 5, 8 and 15 kV.

Check. Machine duty, reeling/trailing requirements, mechanical loads, ground-check circuit, couplers and mine-specific requirements.

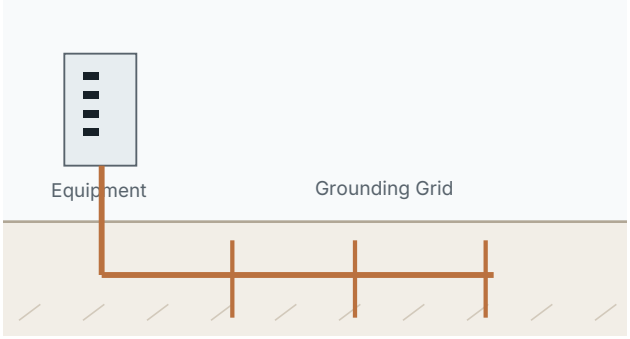
CONNECT THE CONSTRUCTION TO THE JOB

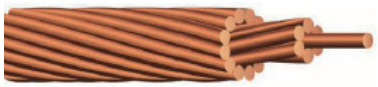
Flexible construction alone does not establish a continuous-flex, trailing or reeling rating. The exact cable must be intended for the movement and equipment duty.

Bare Conductors: Ground and Overhead

A bare conductor has no insulation wall. The system supplies the required separation, supports or grounding arrangement.

Bare Copper | Grounding and Bonding





Example. A facility connects suitable equipment to its bonding network or installs a designed grounding grid.

Why It Fits. Copper provides a conductive path. The required size, temper, strand construction and connections depend on whether the function is bonding or grounding.

Check. Fault duty, corrosion, connections and the grounding design. A ground electrode and an equipment bonding conductor perform different jobs.

AAC / ACSR | Overhead Utility Lines





AAC



ACSR

Example. Conductors span between poles or structures in an overhead distribution or transmission system.

Why It Fits. AAC uses aluminum throughout. ACSR surrounds a steel reinforcing core with aluminum strands, combining electrical conductivity with mechanical strength.

Check. Sag, tension, span, ice/wind loading, fittings and clearances under the utility design. The bare conductor itself has no insulated-cable voltage rating.

CONNECT THE CONSTRUCTION TO THE JOB

Overhead utility work can be governed by utility-specific rules as well as the project specification. Do not apply a building-wiring example to an overhead line unchanged.

CSA, UL and Installation Approval

Certification evaluates a cable as a product. The Canadian Electrical Code and the local authority govern how that cable may be installed.

01 **STANDARD**

Requirements

02 **CERTIFICATION**

Evaluated Product Scope

03 **INSTALLATION**

Permitted Use on This Job

CSA Group

CSA Group develops standards and provides testing and certification through distinct functions. A CSA product standard states requirements; a CSA certification mark identifies evaluated product scope. Certification can cover Canada, the U.S. or both, as indicated by the mark.

UL Solutions

UL Solutions also tests and certifies products for specified markets. A UL certification for Canada evaluates the product to applicable Canadian requirements. The letters UL alone do not establish Canadian certification; read the complete mark, country indicators and record.

TWO INDEPENDENT CHECKS

First establish that the exact product is appropriately certified. Then establish that its type, ratings and installation method are permitted for the job.

How a Cable Becomes Certified

Certification is an evaluation and ongoing control process. It is more than a single laboratory test or a certificate number.

01 Define the Product

Identify cable type, materials, construction, size/voltage range and intended market. Select the applicable product standard.

02 Evaluate and Test

Review construction and samples. Tests may address electrical insulation, dimensions, ageing, flame or mechanical performance.

03 Authorize the Scope

The certification record defines covered products and conditions. Marking authorization applies to that evaluated scope.

04 Maintain Compliance

Factory surveillance, production controls and required routine tests support ongoing conformity. Product changes may need review.

Type Tests and Routine Tests

A design evaluation demonstrates specified performance. Routine production tests check specified aspects of manufactured cable. Neither a routine test sheet nor an ISO 9001 certificate alone is product certification.

Read the Record

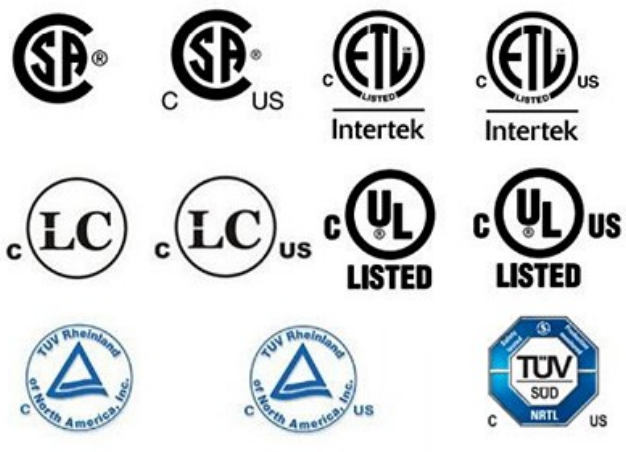
Match the manufacturer, product designation, size/construction range, ratings and standard. A contract or file number helps locate the record; it is not approval for every cable sold by that company.

CHANGES MATTER

Changing the insulation compound, wall thickness, conductor design or factory can affect certification. Approved construction and production controls must stay aligned.

Read CSA and UL Marks

The organization name identifies the certifier. Country indicators and certification category identify what the mark covers.



Examples of Canadian and Dual-Market Marks

Country indicators and mark details matter. The image also shows other certification bodies.

Mark / Notation	Market Indicated
CSA (Canadian Mark)	Canada
CSA with C and US	Canada and U.S.
CSA with US Only	U.S.
UL Listed (U.S. Only)	U.S.
cUL / UL with Canada Indication	Canada
cULus / UL with US-CA Indication	Canada and U.S.

Listed or Certified Products

Read the product category and applicable standards. Modern enhanced marks can use CA and US country codes. For wire and cable, check the required reel/package mark as well as the cable legend.

Recognized Components / AWM

Recognition is for components used under stated conditions within equipment. AWM means Appliance Wiring Material. A component mark alone does not make a wire general-purpose field-installed building wire.

A CANADIAN CERTIFICATION CAN COME FROM DIFFERENT BODIES

CSA and UL are not the only accepted certification bodies. The mark and certification scope must meet the requirements of the authority having jurisdiction.

How the Canadian Electrical Code Works

CSA C22.1, the Canadian Electrical Code, Part I, sets installation safety requirements. It becomes enforceable through the rules adopted by the relevant jurisdiction.

01

National Installation Standard

CSA Group publishes the CE Code, Part I. The 2024 publication is the 26th edition.

↓

02

Provincial / Territorial Adoption

The applicable jurisdiction establishes the edition in force, effective dates, amendments and transition arrangements.

↓

03

Local Application and Inspection

The authority having jurisdiction administers approval, permits and inspections within its mandate. The installation must satisfy the adopted requirements.

Part I: How It Is Installed

C22.1 addresses wiring methods, conductor sizing, protection, grounding/bonding and particular installations. It is the framework used to evaluate the installed electrical system.

Part II: How the Product Is Built

Product safety standards, often in the C22.2 series, address construction and performance of equipment and cables. Product compliance supports, but does not replace, Part I installation compliance.

CHECK THE EDITION FOR THE PROJECT

For example, Alberta brought the 2024 CE Code into force on April 1, 2025. Other jurisdictions have their own adoption details. Check the rules applying to the project location and date.

Find Your Way Around the CEC

Start with the installation question, then find the relevant rule, table and any special section. This is a navigation map, not a substitute for the adopted Code.

Start Here	Question It Helps Answer
Section 2 | General Rules	Is the equipment approved and installed under the general requirements?
Section 4 | Conductors	What conductor material, ampacity and temperature limitations apply?
Section 8 | Loading	What load must the circuit or feeder supply?
Section 10 | Grounding and Bonding	What protective conductive paths and system connections are needed?
Section 12 | Wiring Methods	May this cable or raceway be used here, and how must it be installed?
Section 14 | Protection and Control	How is the circuit protected and controlled?
Special Installations	Examples: Section 18, hazardous locations; Section 36, high voltage; Section 64, renewable energy and energy storage.

Table 19

Conditions of use for many insulated conductors and cables. Read it with the applicable Rules.

Ampacity Tables

Tables 1-4 cover common Cu/Al arrangements. Select the correct table and apply relevant conditions.

Appendix Notes

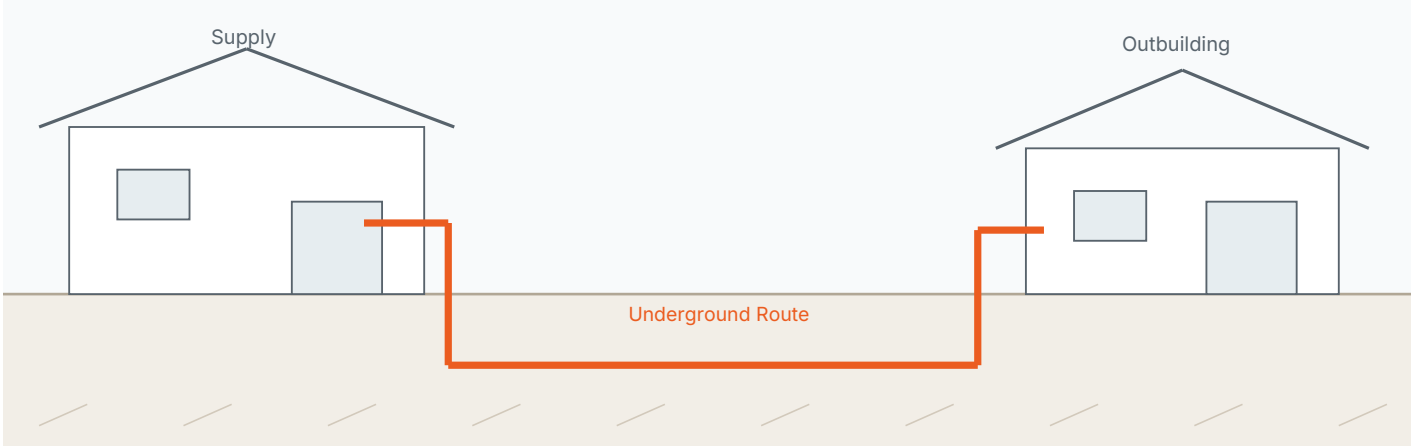
Explanatory notes help interpret Rules. They do not replace the requirement in the Rule itself.

THE CABLE NAME IS THE STARTING POINT

Finding a cable type in a table does not complete the selection. Location, support, protection, temperature, termination and any special-section requirements still apply.

A CEC Example: Power to a Garage

Consider a 120/240 V feeder from a house to a detached garage. The route includes an underground outdoor section. This example shows the decision process.



Decision	What to Establish
1 | Describe the Route	Identify the location, burial or raceway method, moisture, damage exposure and entry into each building.
2 | Choose a Suitable Type	Possible approaches include listed NMWU cable, suitable underground single conductors, or a permitted jacketed armoured cable. Each has different conditions.
3 | Determine Circuit Requirements	Calculate the load, then address ampacity, voltage drop, overcurrent protection, terminal limits and grounding/bonding.
4 | Confirm the Installation	Match certification and markings to the selected product. Apply support, cover, protection, fittings, permits and inspection requirements.

WHY NMD90 IS NOT THE DEFAULT HERE

An indoor wall-wiring example does not establish suitability for this buried route. Select for the actual environment before choosing the conductor size.

Verify the Exact Cable

Read the certification record, cable legend and reel/package label together. Each provides a different part of the cable's identity and approval information.

Check	What You Are Matching
1 Product Identity	Manufacturer / brand, cable family, conductor size and material, conductor count and construction.
2 Certification Scope	Certification body, applicable standard, approved ratings and restrictions. An EdisonFlex™ master contract is a locator, not blanket coverage.
3 Physical Markings	Cable legend and required reel/package mark, rating details and traceability identifiers.
4 Intended Installation	Country, applicable code, location, wiring method and any conditions of acceptance.

Examples of Standards to Recognize

CSA C22.2 No. 38: thermoset-insulated wires and cables. No. 48: nonmetallic-sheathed cable. No. 51: armoured cable. No. 131: Type TECK90. No. 271: photovoltaic cable.

Read the Mark Carefully

A UL mark's country indicators matter: cUL relates to Canadian certification; cULus indicates both Canada and the U.S. Appliance Wiring Material (AWM) is a component category, not a blanket building-wire approval.

NOT INTERCHANGEABLE

CSA and UL are organizations; cable type names and standard numbers describe other parts of the approval picture. Always read the scope.

Read the Cable Description

Break a long specification into fields. Then compare it with the actual legend, datasheet, certification and reel label.

EDISONFLEX™ 500 MCM AL RW90 XLPE 2000 V 90°C BLACK

500 MCM	AL	RW90	2000 V
Metal Area	Conductor Metal	Cable Type	Voltage

Illustrative specification line; actual legends include required certification and traceability markings.

What the Example Tells You

500 MCM means 500 kcmil conductor area. AL means aluminum. RW90 identifies the cable type. XLPE identifies the insulation. 2000 V is the voltage rating shown for this example. The temperature rating needs installation context.

What Still Needs Confirmation

Conductor count, actual certification markings, wet/dry ratings, flame and sunlight ratings, reel length and traceability. Jacket colour is an identification choice or specification requirement; it is not a universal voltage code.

READING A COMPLETE SPECIFICATION

A complete description includes conductor metal, sizes, conductor count, any bonding conductor, insulation level where relevant, jacket colour and required markings.

What Ratings Really Mean

A cable can meet one requirement without meeting another. Read each environmental or performance claim separately.

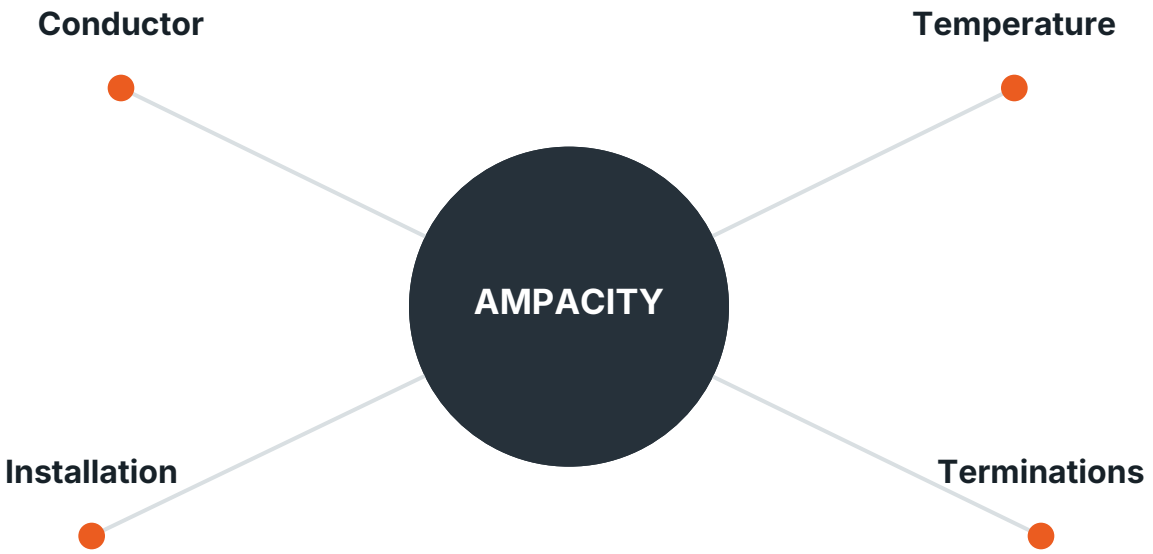
Rating / Claim	What to Understand	Do Not Assume
Voltage	Electrical rating for the stated cable construction.	A higher voltage rating resolves every application issue.
Temperature	Limits vary by operating, emergency, short-circuit or installation condition.	A 90°C cable permits 90°C at every terminal.
Wet Location	Suitability for moisture under the listing.	Wet-rated always means direct-burial-rated.
Direct Burial	Suitability for installation in earth as listed.	Excavation protection and installation rules no longer apply.
Sunlight / Oil Resistance	Performance for the stated exposure and test.	Every outdoor or oily environment is covered.
Flame / Smoke / Halogen	Different tests address flame spread, smoke or chemical content.	Flame-retardant means fireproof or circuit integrity.
Bend / Flex Performance	Minimum bend radius and movement duty are product-specific.	A flexible cable is rated for repeated machine motion.

ASK FOR THE TEST OR LISTING

"LSZH," "flame-retardant" and similar phrases need defined requirements. Never substitute a marketing phrase for a required test or certification.

Specify Before You Size

Conductor size is only one selection input. Ampacity means allowable current under defined conditions.



The Essential Questions

What voltage and current? AC or DC? Copper or aluminum? How many circuits? What installation method, ambient temperature and grouping? What environment, movement, termination and approval requirements?

Know When Engineering Is Needed

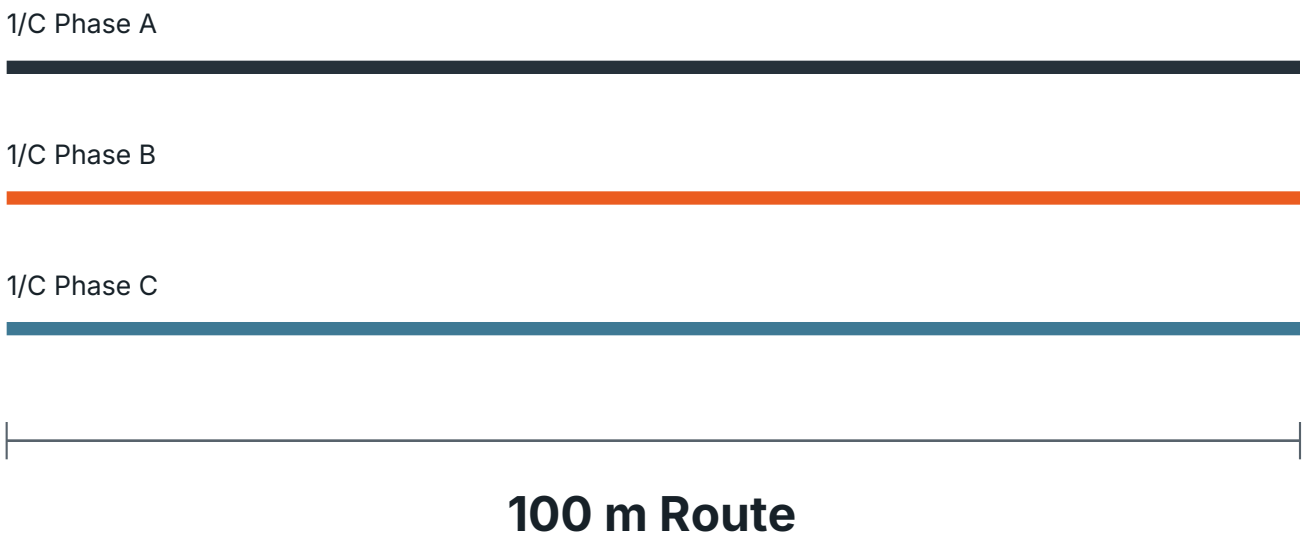
Ampacity, voltage drop, fault withstand, protection coordination and pulling design need project-specific evaluation. Use the applicable code, engineering tables and manufacturer data. A product's temperature rating alone is not an ampacity calculation.

THE COMPLETE PICTURE

Cable type describes a construction. Final size and suitability also depend on installation conditions, electrical performance and the project design.

Reels, Lengths and Delivery

A route length is not always an order quantity. Confirm how many separate cables run along the route.



3 separate single-conductor cables × 100 m = 300 conductor-metres

Single-Conductor Versus Multicore

Three separate phase cables over a 100 m route need 300 conductor-metres before allowances. One three-core cable over that route needs 100 cable-metres before allowances. Add the project's termination, routing and spare allowances.

Make the Unit Explicit

State metres per reel, number of reels and total cable metres. If a document uses “ml” for linear metres, confirm that convention. Record cut lengths, drum limits, delivery sequence, end sealing, handling and storage requirements.

RECEIVING CHECK

Match the purchase order, reel label, cable legend, length and condition. Record damage or discrepancies before the cable enters the installation.

Cable Selection in Practice

These examples show how the application leads to different construction and rating requirements.

01 Outdoor Industrial Feeder

An outdoor installation needs a 600 V armoured feeder.

Wet exposure, burial or tray routing, conductor metal, size, core count, bonding and chemical exposure all affect the choice. ACWU90 or TECK90 may fit, depending on the exact requirements and listing.

02 Solar Collection System

A solar project needs cable between an inverter and a transformer.

This is on the AC side of the inverter. Voltage, route and equipment connections determine the required cable. The project's solar application does not make PV string cable suitable for every circuit.

03 Portable Mining Equipment

Portable mining equipment requires a flexible 5 kV power cable.

Movement, mining duty, shielding, grounding and ground-check conductors must match the equipment specification. An SHD-GC construction may suit this type of application.

CONSIDER EACH EXAMPLE

What information is already known? Which construction features follow from the application? What details still need to be checked in the product specification?

Check Your Understanding

Try these questions to review what you have read. Compare your answers with the explanations on the next page.

1. Name the three basic jobs of a power cable's conductor, insulation and jacket.
2. For the same conductor material, does 2 AWG or 10 AWG have more metal area?
3. Does a finely stranded conductor automatically make a cable suitable for continuous motion?
4. What are the different jobs of a shield and a bonding conductor?
5. Which TECK90 layer sits between the cable core and the armour?
6. Is a 90°C cable rating enough to determine its allowable current?
7. Does a wet-location rating automatically permit direct burial?
8. What does 133% insulation level tell you? Is it 133% operating voltage?
9. Does a U.S.-only UL mark establish Canadian certification or permission for every installation?
10. A 100 m route uses three separate single-conductor phase cables. How many cable metres are needed before allowances?

MAKE THE CONNECTION

Choose a cable type from the guide. In your own words, describe its main layers, a typical application and two ratings that matter for that application.

Answers and Useful Terms

Compare your answers with the explanations below. The glossary provides a quick reference for terms used throughout the guide.

1. Conductor carries current; insulation separates electrical potentials; jacket protects the assembly from its environment.
2. 2 AWG. Within the numbered AWG sizes, a smaller number means a larger area.
3. No. Continuous motion needs a cable specifically designed and rated for that duty.
4. A shield manages electric fields and/or interference; a bond provides a fault-current path for exposed conductive parts.
5. The inner jacket.
6. No. Installation, ambient conditions, grouping, terminations and applicable rules also matter.
7. No. Confirm the direct-burial listing and installation requirements.
8. It relates to insulation design for the system grounding/fault-clearing conditions. It is not permission to operate at 133% voltage.
9. No. Confirm Canadian certification, then check the adopted installation code, wiring method and location.
10. 300 cable metres, before routing and termination allowances.

Quick Glossary

Term	Meaning
1/C / 3/C	One / three insulated conductors
kcmil / MCM	Thousand circular mils; conductor area
XLPE / TRXLPE	Crosslinked / tree-retardant crosslinked polyethylene
EPR / PVC	Ethylene propylene rubber / polyvinyl chloride
Bond / Shield	Fault-current path / field-control or interference layer
Ampacity	Allowable current under defined conditions
CN	Concentric neutral; copper wires around the insulated core
CEC / AHJ	Canadian Electrical Code / authority having jurisdiction

BUILD THE HABIT

Identify the circuit. Read the construction. Verify the rating. Confirm the application.