



EDITION 28
VOLUME 1

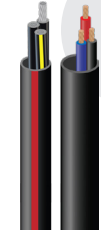
9 ONLINE CALCULATORS TO EXECUTE INFRASTRUCTURE PROJECTS

COMPOSED BY

Dr. Yuhsein Hawig, VP of Applications Engineering
Edwin Marquez, Director of Applications Engineering

1

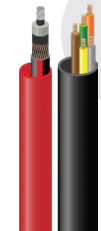
1. CONDUIT FILL CALCULATOR



Conduit fill ratio is the percentage of area inside the conduit occupied by the cable(s). This online tool helps electricians, design engineers, and contractors answer the question, "What size conduit do I use per the NEC®?" You can also download the iOS or Android app to compute the conduit fill values and estimate the jamming probability for multiple conductors per NEC® or utility best practices. Conduit type and size are selected first then cables are added one by one. The dropdown menu lists the most common products but allows you to customize using user-defined dimensions.

2

2. CABLE-IN-CONDUIT LABOR SAVING CALCULATOR



Ruggedized HDPE conduit, certified to UL-1990, is lead-free and naturally halogen-free, which prevents the toxic gas from being generated in case of overheating during short circuits or emergency overload. Any cables rated for wet locations can be pre-assembled into the conduit to create an all-in-one assembly. Because the time and the crews to handle and pull cables separately in the field are eliminated, Cable-in-Conduit (CIC) utilization can reduce many man-hours during installation. You can now confirm the CIC labor cost reduction using Southwire's free online estimator.

3

3. VOLTAGE DROP CALCULATOR



It is the most frequently used Southwire calculator, which features three functionalities for residential and commercial applications. Firstly, it computes the minimum conductor size for a given circuit length, current, voltage, and voltage drop. Secondly, it estimates the maximum circuit distance for a specific conductor, current, voltage, and voltage drop. Lastly, it calculates the voltage drop given the conductor size, voltage, current, and the circuit length. The maximum voltage drop per the National Electrical Code® (NEC®) is 3%. The PDF report includes the inputs, results, and engineering parameters such as ampacity, AC resistance, and power factor. Mobile apps for Android and iOS are also available to download.



REINFORCE
RESILIENT
RELIABLE

RE³™ CALCULATOR OVERVIEW

Southwire offers many free technical tools online for engineers, contractors, and end users to execute the most complex electrical wiring routes for infrastructure projects. Reinforced, Resilient, and Reliable cable designs or more economical system solutions can be achieved using nine Re³™ calculators featured in this whitepaper. Scan the QR code to access the website.



SUCCESSES ON INFRASTRUCTURE DEPLOYMENT

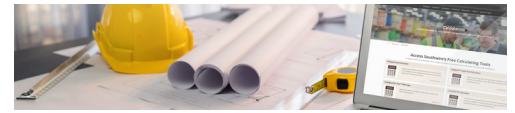
Our customers have successfully deployed numerous infrastructure projects using Southwire's calculators. Examples include industrial facilities, data centers, renewable power generations, mass transit, EV charging stations, ports and airports, telecom, and utility expansions. Southwire CableTechSupport™ Services team provides additional support to interpret calculator results and prepare submittals to gain approvals from inspectors and Authorities-Having-Jurisdiction (AHJ). Team qualifications include Ph.D., MBA, Master of Science degrees, and Professional Engineer (PE) certifications. The group handles over



15,000 technical requests and authors 100 engineering letters yearly. Scan the QR code to learn more.



Southwire®



4. POWER CONVERSION CALCULATOR

This tool designs diverse electrical systems in transportation (EV, rail, airports), renewable power generation (Solar, Wind, BESS), utility upgrades, and commercial buildings. You can derive voltage (volts), current (amps), or power (kilowatts) for DC, AC single-phase, or AC three-phase systems. If the calculated voltage exceeds 600V but stays below 1000V, then dual-rated 600V/1kV Type XHHW-2 conductors are recommended to power the circuit. This calculator allows contractors to confirm bills of materials for RFQs.

7. CABLE PULL CALCULATOR

This is the most complex engineering calculator with the longest track record under Southwire's extensive online tools offering and it has undergone countless revisions. Our engineering team will continue to improve it by adding advanced functionalities to accommodate all cable designs and unique routes. Mistakes are costly if maximum pulling tension or sidewall bearing pressure is exceeded and physical damages are incurred, therefore, we recommend conducting the full pulling calculations in advance to evaluate the entire route, the coefficient of friction (CoF) for different jacket materials, the number of bends, and the angle of each bend to prevent cable damage.

5. CONCENTRIC NEUTRAL RATINGS CALCULATOR

This tool can reduce the cost of primary MV cables without compromising safety suitable for bipartisan infrastructure projects requiring Made-in-America products. Over 200 design combinations are available for a specific conductor size. One can select 13 neutral configurations for a utility's MV-90 or a renewable's MV-105 systems. An example of the 1/3 neutral design for a 35kV Aluminum 250 kcmil conductor is shown here. MV-90 with 13 X 14 AWG under an LLDPE jacket is equivalent to the MV-105 with only 10 X 14 AWG under an XLPE jacket, which yields a 23% reduction in copper neutrals.

8. CONFIGURATOR PLUS™ WEB APP

Southwire launched this web-based app in 2018. This cloud-connected, username-specific, function-automating site allows users to easily update the wire feeder schedules on the desktop, laptop, or tablet. It enables contractors, distributors, agents, and engineers to configure each wire pull by inputting the length, wire type/size, circuit ID/tag info, and pulling sequence. This online tool has redefined the planning and the order execution of wire and cable products, providing a streamlined experience to obtain a quote and get the right materials on the jobsite.

6. VFD CABLE SELECTOR

This Variable Frequency Drive (VFD) cable size estimator ensures a proper selection of VFD cables for a specific installation based on application temperature, drive horsepower (hp), cable length, and operating voltage. Three common cable thermal ratings, 60, 75, and 90°C, and three motor nameplate voltages, 230, 460, and 575 volts are included for selection. Combining six inputs, including a wide range of horsepower and maximum ambient temperature, allows the users to compare over 3000 design variations and access the Southwire VFD cable library. This tool can also be downloaded as an Android or iOS mobile app.

9. LED LIGHTING SAVINGS CALCULATOR

This calculator estimates the cost saving by switching from traditional temporary lighting to light-emitting diode (LED) based design. One can input the wattage and number of fixtures for the existing lighting apparatus and enter the time frame, including the average use per day and the total duration. Based on the cost of electricity and the wattage of the replacement LED bulbs, the cost saving will be computed to show the existing cost vs. the reduced LED cost. You can also access Southwire's overhead lighting product catalog via the same page.