

## NEC COMPLIANT APPLICATIONS OF TC-ER-JP CABLE FOR POOLS, SPAS AND HOT TUBS IN ONE- AND TWO-FAMILY DWELLING UNITS

**SYNOPSIS:** Confusion and misinformation exist regarding NEC requirements for TC-ER-JP cable when used for installations of pools, spas, and hot tubs in one- and two-family dwelling units. The NEC recognizes Tray Cable Type TC-ER-JP as a suitable wiring method for both power and control circuits in one- and two-family dwelling units. When installed in accordance with NEC requirements, it can safely connect a multitude of different types of equipment. This whitepaper answers questions related to NEC requirements for installations of TC-ER-JP cable for pools, spas, and hot tubs in one- and two-family dwelling units.

### ➤ DOES THE NEC ALLOW TYPE TC-ER-JP CABLE IN INSTALLATIONS FOR POOLS, SPAS, AND HOT TUBS

Section 690.11(A) covers underground wiring for pools, spas, and hot tubs by reference. Within 5 feet horizontally from the pool wall's edge, only the approved wiring methods called out in 680.11(A) may be used. Article 680 is silent on wiring outside of the 5-foot limit. As such, the rules for wiring outside the 5-foot limit default to Chapter 3 of the Code. Following this logic, TC-ER-JP cable is acceptable outside the 5-foot limit for installations of pools, spas and hot tubs associated with one- and two-family dwelling units. The suitability of Type TC-ER-JP cable for use at 75°C ampacities is covered in the whitepaper titled "TC-ER-JP Cable in EV Installations Substantiating 75°C Cable Ampacities."

### ➤ WHAT RULES APPLY TO UNDERGROUND INSTALLATIONS OF TYPE TC-ER-JP CABLE FOR POOLS, SPAS AND HOT TUBS

If installed underground, the requirements of Article 340 for underground feeder (UF) cable apply. Compliance with these requirements is specified in Section 336.10(9), which states that TC-ER-JP cable, when installed as exterior wiring, shall be installed per the requirements of Part II of Article 340. The items to note in Part II of Article 340 are as follows. The cable shall not be embedded in poured cement, concrete, or aggregate; and shall be protected from physical damage where necessary. The cable needs to be rated for direct burial when installed underground.

### ➤ WHAT RULES APPLY TO ABOVE OR AT GRADE INSTALLATIONS OF TYPE TC-ER-JP CABLE FOR POOLS, SPAS AND HOT TUBS

If installed above or at grade, the rules of Chapter 3 for outdoor installations would apply. TC-ER-JP cable installed within the interior of a dwelling unit needs to follow the installation requirements for nonmetallic cable in Article 334. That portion of the cable which is outside the dwelling unit will need to follow the installation requirements for exposed work in 334.15. This section covers the installation of cable in unfinished basements and crawl spaces. This section does not discuss installations under a deck. However, a deck can be associated with a crawl space for the purpose of identifying installation requirements for a cable under a deck. A deck can also provide the physical protection required in 334.15(B). If the cable is installed outdoors it needs to be UV rated.

➤ **ARE THERE SPECIFIC REQUIREMENTS FOR THE USE OF TC-ER-JP CABLE IN OUTDOOR PERMANENTLY INSTALLED AND SELF-CONTAINED SPAS AND HOT TUBS**

Requirements for permanently installed and self-contained spas and hot tubs are covered in Part IV of Article 680. These requirements are unclear relative to the use of TC-ER-JP cable. Section 680.40 states that electrical installations at spas and hot tubs shall comply with the provisions of Part I and Part IV of Article 680. If a spa or hot tub is constructed like a permanent in-ground outdoor pool, then the 5-foot limit would apply, and the wiring rules are as previously discussed. Outdoor installations of packaged spa or hot tub equipment assemblies or self-contained spas or hot tubs that utilize a factory installed or assembled control panel or panelboard are covered in Section 680.42(A). This section permits the use of flexible connections covered in 680.42(A)(1) and (A)(2). Flexible conduit is the title of (A)(1) and permits liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit to be used as a wiring method. These permissions are modifications to the approved wiring methods in 680.11(A). Because the wiring to a packaged spa or hot tub is connected to a control panel that is part of the packaged assembly, it would seem that this wiring would always be within the 5-foot limit if the walls of the spa are being treated in the same way as the walls of a pool. This is where the rules are not so clear. Since Section 680.42 allows for flexible connections to the control panel of the packaged equipment, a cable with a liquidtight fitting would appear to be acceptable. If the cable is installed underground, there would be no need for physical protection against damage. If the cable is installed above or along grade, exposure becomes a concern. Exposed wiring to a self-contained spa needs to be enclosed in conduit or provided with some means of physical protection to prevent damage.

➤ **NEC ARTICLE 680 HAS REQUIREMENTS FOR WIRING METHODS AND EQUIPMENT IN CORROSIVE ENVIRONMENTS. HOW ARE THESE REQUIREMENTS APPLIED.**

Section 680.14 covers wiring methods and equipment in corrosive environments. Interpretation of this section is difficult as the requirements are written in a very general manner. Section 680.14(A) states that wiring methods shall be suitable for use in corrosive environments and goes on to give examples of wiring methods that are to be considered suitable for such use, but does not exclude the possibility of other wiring methods being suitable except for aluminum conduit and tubing which are not permitted. Considering how these requirements are presented, they should not be an obstacle to the use of TC-ER-JP cable. However, it is recommended not to install the cable where it is directly exposed to pool chemicals.

Best practice: As local inspectors may not be aware of NEC requirements for TC-ER-JP cable and to preclude delays in final inspection approval, TCERDirect® and Gen-Pro Products strongly encourage that installers confirm with their local building inspector that the proposed installation meets their approval prior to using TC-ER-JP cable in pools, spas, and hot tubs in one- and two-family dwellings.

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