



## **Rigid Conduit, Fittings, and Accessories – Frequently Asked Questions**

I am looking for a 4" fiberglass conduit product. Do you make such a product?

Carlton does not make a fiberglass conduit. We do sell 4" fiberglass Multi-Gard with three or four pre-installed innerducts, but not on its own. Two companies come to mind: United Fiberglass (USA) and FRE Composites Inc. (Canada).

I am working for the U. S. Government for the "Office of Overseas Buildings Operations (OBO). We have procured big quantity of "Carlton plus 40 rigid non metallic conduits" for the project work, being executed in Abu Dhabi. Please advice us of your recommendation on storage of "Carlton plus 40 rigid non metallic conduits". Can "Carlton plus 40 rigid non metallic conduits" be stored in an open to sky area in direct sunlight, the temperature in this region goes up to 50C to 55C with 100% humidity.

Carlton Schedule 40 PVC Conduit is designed for outdoor applications in all weather conditions. Therefore can be stored outside without any additional protection. We recommend when stacking the crates that the wood "slates" used to bundle the conduit are placed on top of each other and not directly onto the conduit.

What is the difference between sch 40 and sch 80? What applications would you use one compared to using the other one?

Schedule 80 Conduit will have a thicker wall. OD's will remain the same. Section 347-3(c) of the 1999 NEC (352.12(C) of the 2002 NEC) states that Rigid Nonmetallic Conduit is not permitted where subject to physical damage unless identified for such use.

Schedule 80 conduit is listed and identified for the areas of physical damage. If you are concerned with impacts or crushing after the raceway has been installed than schedule 80 conduit should be used.

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I'm trying to deal with a Government spec that speaks in terms of thick wall and thin wall PVC. Can you tell me what these terms mean as they relate to your products?

We refer to Schedule 40 conduit as heavy wall EPC (electrical plastic conduit) and our Schedule 80 conduit as Extra Heavy Wall EPC. There is no official definition of thin wall vs. thick wall as it is relative. I'm sure there is more information in the government spec, such as a reference to a NEMA spec or perhaps a UL standard.

Is nonmetallic rigid schedule 80 conduit approved for use in a class 1 division 1 area?

501.4(A)(1)(a) Exception, either Schedule 40 or 80 PVC conduit can be used if the conduit is encased in concrete a minimum of 2" thick (all the way a round) and buried a minimum of 24". Threaded rigid conduit has to be used on both ends for the last 24" of underground to emergence or point of connection to the aboveground raceway.

This is the only acceptable way to use RNC in Class 1 Div 1 (with the exception of gas stations, fuel storage and other fuel dispensing).

Article 347 of the 1999 NEC Handbook states that PVC conduit must be "marked" for 90 degree C conductors. Your literature states that Plus 40 and 80 is "rated for use with 90 C conductors". Is your Plus 40 and 80 actually UL listed for 90 degree C conductors? What is UL E35297, and does it relate to the use of 90 degree C conductors? This same question applies to type DB raceway. Is it UL listed for 90 C cable?

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Yes, our conduit and duct is rated for 90 deg C conductors. The DB duct is not UL listed, however. The Plus 40 and Plus 80 is actually UL listed for 90 C conductors. E35297 is our UL file number. Carlton Plus 40 and Plus 80 is the product you want to use in accordance with Article 347 of the 99 NEC.

The question keeps coming up about running schedule-40 RNC underground and changing over to Schedule-80 above ground, for physical protection. The ID of schedule 80 will produce a ledge inside the conduit at the transition, which could damage conductors when pulled in the raceway. At this point we are not allowing the co-mingling of the two schedules of conduit. Do you know of any listing or testing that has been done by Carlton or any others to support the co-mingling of the two schedules of RNC?

It is common to use Schedule 40 PVC Conduit with Schedule 80 PVC Conduit and is "Co-mingled" often. It is true that an edge does exist and needs to be addressed. There will not be a problem if you are pulling from schedule 80 to schedule 40 since the cable would be going from a smaller ID to a larger. In this case it would be a step down. It is recommended that the ID at the spigot end of the Schedule 80 conduit, where the transition occurs, be "reamed" by a knife or reaming tool to give the conductors a smooth transition for the one conduit to another.

As a member of Panels 3 and 8 of the National Electrical Code, I can assure you that the panel recognizes using the two conduits together.

[Is there a new rule about using Schedule 80 aboveground?](#)

Section 230-50(a) of the 1999 NEC states that service cables, where exposed to physical damage, is required to be protected by any of the following:

(1) Rigid Metal Conduit

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- (2) Intermediate Metal Conduit
- (3) Rigid Nonmetallic Conduit Suitable for the Location
- (4) Electrical Metallic Tubing
- (5) Other approved means

The only Rigid Nonmetallic Conduit suitable for the location (Area of Physical Damage) is Schedule 80 Rigid Nonmetallic Conduit. In the 2002 NEC, they replaced "(3) Rigid Nonmetallic Conduit Suitable for the Location" with "(3) Schedule 80 Rigid Nonmetallic Conduit".

The only time schedule 80 PVC conduit would be required is when the service cable is exposed to physical damage. The AHJ needs to determine if the cables are exposed to physical damage since there is not a definition of physical damage in the code. Some AHJ state if the cable is coming out of the ground next to a house into a meter then it has to be installed in schedule 80 conduit. Other AHJ are not as strict.

Schedule 40 conduit can be used underground and transition to the schedule 80 (usually at the elbow).

When it comes right down to it the rule in the code has not been changed at all, just the description.

We are a local inspection agency. As you know the use of schedule 40-pvc has been greatly limited in the 2002 NEC. There is a story going around that schedule 80 fittings are not available. We will be enforcing the 2002 NEC Code if these fitting are not available that will mean that sales of schedule 40-and 80-pvc just took a turn for the worst. If these fittings are not available why is that true schedule 80-nonmetallic conduit is not a new product? What is the true story?

Carlton does not manufacture separate fittings for Schedule 40 and separate fittings for Schedule 80 (except for the elbows which are formed from Sch. 40

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and Sch. 80 conduit and fall under the UL category of conduit, not fittings) since the fittings have been UL approved to be used with both Schedule 40 and Schedule 80.

Schedule 40 PVC has not necessarily been severely limited as Schedule 80 is only required in areas subject to physical damage, which is usually a limited height coming out of the ground along the exterior wall of a building (Articles 300.5 (4) and 352.12(C)), for example, or in a parking garage or up along a pole. Subject to physical damage areas are where a car or lawnmower or something will impact the conduit. The uses not permitted for RNC for areas subject to physical damage unless identified for such use has been around for quite awhile and Schedule 80 has always been permitted for areas subject to physical damage. This is nothing new.

PVC conduit and fittings have been listed since the 1960's. Schedule 80 has a thicker wall than Schedule 40. They both have the same OD but different ID's and thus a different wirefill. The fittings are either over or under the conduit anyways, so even if they are impacted, the conduit is still there to provide the impact protection.

Remember, most damage occurs by not using expansion fittings, because the force of contraction/expansion can be great enough to pull apart joints.

[I am not able to find the coefficient of friction for Sch 40 PVC. Did I miss it in the web site?](#)

I always recommend 0.1

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Of course this can change depending on the type of cable you are pulling in. I also recommend you see the attached website. It has a lot of information including a calculator for determining the actual tension per pull.

[www.polywater.com](http://www.polywater.com)

[Is your conduit the same as CPVC?](#)

No. We don't carry CPVC, which is chlorinated polyvinyl chloride.

[I am a self-employed electrician located in Western Massachusetts and was working on a repair job to a swimming pool last week. The pool installers were replacing the underground PVC flexible tubing because of leakage. In the process of digging a new hole for the new tubing one of the underground wires was damaged. I happened to ask the pool repairman what the cause of the leakage was, and he stated "termites" had eaten through the PVC. This kind of made me curious, as I have installed many underground electrical systems using PVC nonmetallic rigid conduit and have never seen or heard of this problem before. Has there been any tests done to determine if termites will do damage to PVC conduit?](#)

Insects and termites do not damage PVC conduit. They've been known to damage some types of Plastics, but not PVC.

There was a study in Gulfport, Mississippi in 1955 where sample of PVC were exposed to termite attack. After more than four years of exposures to the termites, there was no sign of termite attack on PVC Samples.

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Can one of you tell me what the radius is on the following items - UA5AR, UA5AN ?

The same radius applies as for the standard 90 and 45 degree elbows. See page 145 of the 2001 Price Guide. For the 6" elbow, the radius is 30". For the 4" elbow, the radius is 16".

Do you have a rigid non-metallic conduit rated for use with power cables rated 105 degrees C (MV-105)?

Please recognize that most wire and cable manufacturers no longer mark Type MV conductors or cables for 90 degrees C since the conductors meet the 105 degree C requirements and are marked for the higher temperature rating. The code currently prohibits the installation of the 105 Type MV conductors and cables since they are rated higher than the RNC temperature rating.

The temperature rating of the conduit will not be exceeded since the users do not operative MV conductors or cables above 90 degrees C. The rated temperature is based upon the rating of the insulation and jacketing material used in the construction of the cable, not the operational temperature.

There will be proposals for the 2005 NEC to allow 105 Type MC Conductors in RNC. Currently many inspectors will accept MV Conductors or cables in RNC based on 90.4.

Do you have any data or recommendations for your Sched. 40 and 80 products in areas that may be exposed to fumes or splashing (not immersion) of the following chemicals?

Acetonitrile, Dimethylformamide, Methanol, Pyridine, Tetrahydrofuran, Toluene

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Acetonitrile - Not sure, usually anything with Acetone is bad and PVC should not be used.

Dimethylformamide - Not Recommended, severe effect

Methanol - Excellent, no effect

Pyridine - Not Recommended, severe effect

Tetrahydrofuran - Not Recommended, severe effect

Toluene - Not Recommended, severe effect

This is a great site for determining chemical resistance:

<http://www.coleparmer.com/techinfo/chemcomp.asp>

[Does Carlton have any CSA certified Schedule 80 products?](#)

CSA does not recognize heavy wall product over schedule 40. To my knowledge, none of our heavy wall products are CSA approved.

[I have browsed your site and looked in the printed information that I have and can find nothing outlining storage requirements for your products. Is such a publication available? If not please indicate the same.](#)

[We are being told to properly store several thousand feet of the 4" and 5" PVC ridged conduit. The material is stored outside, in the bundles delivered by the carrier for up to 10 months. Our stance is that it does not have to be covered nor raised up on blocks. The conduit is sunlight resistant and in fact storing it on blocks of wood may damage the conduit or at least instill curvatures, which are undesirable.](#)

<http://www.nema.org/products/div5/5tc/tcb2.pdf>

Please refer to the NEMA document at the above website for some guidelines on storage. You don't want to store the product on raised block because sagging will

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occur. Covering the product with a tarp doesn't hurt, but you don't have to. The worst thing that could occur is that some discoloration (aesthetic appearance), but that won't affect the integrity of the conduit.

We are in the process of providing an installation in a salt-water environment. We are utilizing PVC raceways, fiberglass equipment enclosures and stainless steel hardware. We were provided PVC coated Myers hubs with the fiberglass (motor starter) enclosures by the manufacturer. It would be a perfect situation to use threaded PVC to connect to the Myers hubs and then use a male adapter on the underside of our fiberglass wireway (line gutter). Is it acceptable to (the NEC) thread schedule 40 PVC with a regular GRC hand threader?

Threading PVC conduit would void the UL listing. Threading is commonly done if listing and inspection is not an issue. Majority of the people who thread the conduit use Schedule 80 PVC to give themselves a thicker wall.

Can I use 2.5 sch. 80 PVC for a service mast? It will be 18 to 24 in above a roof with out any support. If this is a good installation, how should I connect the Eyebolt to the mast?

Section 230.28 of the 2002 National Electrical Code requires raceways used as a service mast must be identified for the purpose or have the adequate strength. Schedule 80 PVC conduit is not identified for this purpose. If the raceway were supported than it would be acceptable.

Does Carlon publish information on the constant pressure under which their Schedule 40 & 80 PVC conduits will maintain their rigidity?

If you are referring to internal pressures found for Water Pressure Pipe. Carlon does not manufacture such a product.

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If it is an external crush than we would refer to the UL Product Standard, UL651 Section 11, Resistance to Crush. These load requirements vary from 750 Pounds Foot to 1000 lbf for different sizes of Schedule 40 product and is 2000 lbf for all sizes of Schedule 80 product.

Basically you load the conduit with this weight and the product cannot deform more than 70%. This test procedure is similar to ASTM D2412.

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