Reduce material handling, decrease installation time and increase productivity…

Affordable, Efficient & Effective

Electrical Raceway Condensate/Liquid Drains

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Problem

Electrical contractors are under constant scrutiny to provide high-quality installations, while maintaining tight installation schedules and remaining within budget. Outdoor electrical raceway installations are particularly challenging due to site limitations, impediments and general system complexities. Installations in hazardous locations increases the probability that liquid or condensed vapor may form inside the electrical control enclosures or within raceway systems. Contractors must take proper measures to either stop the liquid from accumulating or allow for proper draining to avoid potential electrical hazards [1].

Contractors add drain fittings to raceway system installations. These drain fittings help expel liquid and condensation that tends to form on the interior body of the conduit or may infiltrate the system through seals or breaks. Typically, these drain fittings are installed at a low point within the system so that the liquid or condensate can move naturally to the low point where it can egress from the interior of the system through the drain (Figure 1).

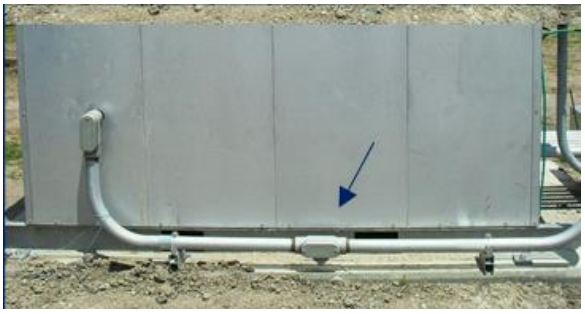


Figure 1. Electrical raceway installation, with T body outlet and drain fitting, installed at low point of raceway.

A T, or TB, shape conduit outlet body and a four (4) part drain fitting are most commonly used to accomplish this.

These conduit outlet bodies and corresponding drain attachments have multiple components. They are rigid, heavy and bulky. Often, they do not meet the NEC bend radius requirements [2] for the subject cable. So, contractors must to upsize the body or add an extra (mogul) style body in order to maintain compliance. The more outlet bodies mean more cable pulling. To contractors that means more labor, more time and more frustration.

In order for these drains to be most effective, they must be installed at low points within the raceway systems. Unfortunately, this limits the locations where these fittings can be installed. As a result, additional mechanical work must be done to eliminate interference or obstructions for the proper placement of these fittings. Adaptations are often required to the surrounding site. Contractors may need to cut into the surrounding structures such as, grates, or skids to allow for proper clearance and space (Figure 2). These modifications are time consuming, slow production and may require additional permitting.

Figure 2. Electrical raceway installation. Grate was cut to provide enough space for drain fitting.

The need for outlet bodies and drain fittings means more materials. The components are expensive to

manufacture, ship and store. Functionally, at each connection point there is the risk of corrosion, condensate/liquid infiltration and premature deterioration of threads and seals. For the client that means increased costs, and lower efficiency.

Electrical contractors are expected to complete high-quality outdoor raceway installations on time, and on budget, while using an inferior condensate/liquid drain fitting technology that is rigid and heavy and with multiple parts. The drain fitting installations are labor-intensive and time-consuming. They are inefficient and ineffective which means costs for contractors and clients alike.

Solution

DMan Enterprise Corporation has designed and developed a monolithic drain fitting that will revolutionize how electrical contractors install these raceway systems. Our patented design provides a more affordable, efficient, and effective means of liquid and condensation mitigation in electrical raceway systems.

Design basics

The DFit [3]

Snapshot:

- Monolithic, minimalistic unibody design
- Tubular coupling with a through bore and connecting portions at opposing ends
- Centrally located tool engaging surface.
- Integral interior liquid drain recess.
- Aperture located on the underside extending into the through bore
- A screen and clip or “Ex Proof” drain plug option attached/installed below the aperture.

Applicable Materials:

○ Galvanized Steel ○ Aluminum ○ Stainless Steel ○ Coated RGS	○ Schedule 40/80PVC ○ Brass ○ Coated RGS ○ EMT
○ Any other approved corrosive resistant material	

Variations:

ERCDN
Electrical Raceway Condensate/liquid Drain Nipple
(Male-Thereon NPT & Metric)
ERCDC
Electrical Raceway Condensate/liquid Drain Coupling
(Female/Therein NPT & Metric)
ERCDCN
Electrical Raceway Condensate/liquid Drain Coupling/ Nipple
(Female Therein / Male Thereon NPT & Metric)

ERCDN & ERCDC are available from ½” – 6” Eng & 16-155 Metric diameters and can be UL & IEC certified.

*For full schematics: ***U.S. Patent 9,722,403 B2***

Design comparative

DFit vs T (TB) body & drain fitting

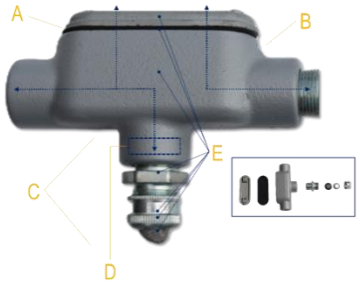
In most external raceway installation either a T or TB shape conduit body with drain fitting attachment is used (Figures 3 & 4). For this comparative we will use the TB outlet body and drain attachment and compare it to our DFit.

Figure 3. Electrical raceways (3) with TB outlet bodies and drain fittings.

Figure 4. Electrical raceways with TB outlet bodies and drain fittings, at low points in the raceways.

The diagram below is a traditional iron cast TB outlet body with gasket, flat cover and drain fitting attachment.

In most cases, the three items making up the diagram; the body, the cover and the drain fitting, are separately cataloged by supplies and are thus ordered as such. In other words, for any given raceway installation, contractors must order the, TB outlet body, the corresponding cover for that body (material and size) and finally the proper drain fitting to attach to the body. Several disadvantages of this design are highlighted below the diagram.



A. Outlet cover and gasket typically fastened to the outlet body with two screws. Commonly a separate part when ordering. Gasket failures create the potential for liquid or condensate infiltration.

B. The rigidity of the outlet body and its acute angles pose challenges for contractors to meet bend radius requirements and may require additional fittings to meet the NEC requirements [3]. Additional fittings, increase the potential for liquid or condensate infiltration and with each fitting, more laborious wiring pulling for the contractors.

C. The drain fitting (threaded into to the lower hub in the example above) extends the body, and requires more space or clearance for proper installation. The protruding components may require contractors to adapt the area around installation for compliance and effectiveness.

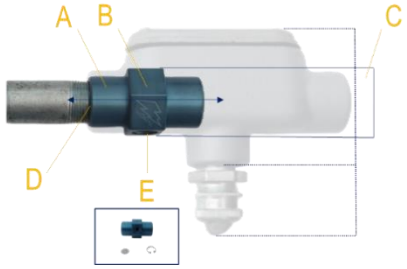
D. The drain fitting is threaded into the hub of the outlet body, increasing the potential for corrosion, premature deterioration and the potential for liquid or condensate infiltration.

E. 7 components/parts make up this drain fitting mechanism:

These flaws are only some of the disadvantages of this design and yet contractors have virtually no other option for raceway installations.

Until now.

DMan is the first to address these design shortfalls (and more). DFit's minimalistic and compact design and monolithic structure is a reformation on the long overdue challenge of drain fitting installations within raceways. The design has numerous manufacturing material sourcing advantages along with obvious practical benefits for installers, some of which are highlighted below:



A. The monolithic (singular piece) design has fewer areas for potential liquid and condensate infiltration and less potential for corrosion and premature deterioration.

B. The hex shape makes threading into the existing conduit easy.

C. The size and weight require less space and clearance at points of installation and it is much easier for contractors to handle and maneuver.

D. The in-line through bore design makes wire pulling easier and it reduces the number of fittings needed as it easier for contractors to maintain bend radius compliance.

E. Perpendicular to the inline through bore is the drain recess and aperture in which the drainage component is applied. The screen and securing clip are flush with the fitting, and with no protrusions (note: aperture is threaded for compatibility with *ex proof* plugs).

- 3 components make up the entire drain fitting

- Screen secured with clip, easily applied and removed with a common Snap Ring Plier (Figure 5).

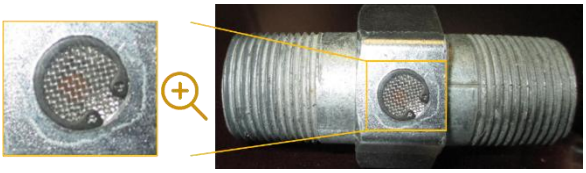
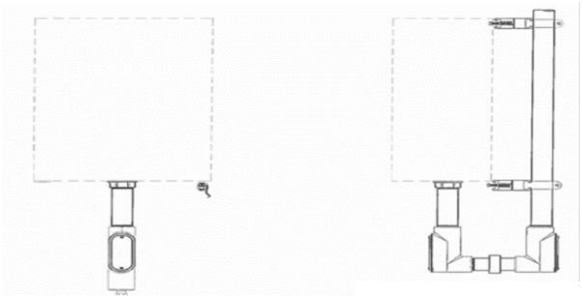


Figure 5. Underside view of a DFit magnified to show the aperture with screen applied and secured with snap ring clip.

Performance

The challenges of bend radius compliance

The NEC provides standard requirements for cable bending for specific installations. In raceway installations requiring condensate/liquid drains, adding fittings such as these can create a challenge for contractors to maintain bend radius compliance. The diagram below is an example of how additional fittings are needed to maintain the cable bend compliance.



The TB body (left) is replaced with LBD moguls (right) in order to maintain cable bend limitations, new condensate/liquid drain nipple needed to be installed with raceway installation. Adding additional fittings means more cable pulling for the contractor, it means more threading and seals which increase the risk of improper installation. The additional threading adds more areas for corrosion, premature deterioration and the potential for liquid or condensate infiltrations. Alternatively, contractors may elect to upsize, another process requiring more resources and materials.

DFit provides a solution to cable bend limitations. It's inline and compact design, allows contractors more freedom with their conduit runs. It greatly reduces the need for moguls and additional fittings. Fewer fittings, means less risk of liquid or condensate infiltrations, less time needed for threading conduit, pulling wires and it decreases the risk of installation error.

The labor of pulling cables

Pulling cables through conduit is often described as the most tedious and frustrating aspects of any raceway installation. For every fitting, a contractor needs to pull the cable through it. The larger the run the more difficult the pull. The more fittings the more pulling needed. This means that at every point a condensate/liquid drain is installed in a raceway system contractors must spend time and energy to pull the cable through the T body outlet before continuing the run.

The DFit, greatly reduces the need for cable pulling and more importantly makes cable pulling easier. The figure below shows the direction of the cable pull using the DFit vs the traditional TB body outlet (Figure 6).

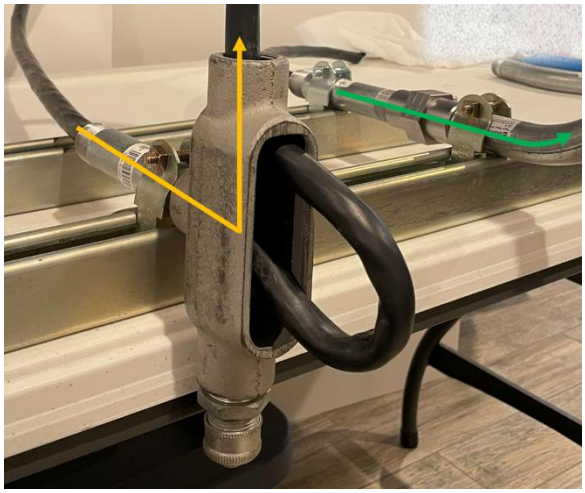


Figure 6. TB body outlet with drain fitting (left), displays the acute angle of the cable's path (yellow). The cable is pulled through the body, at the opening and then ran through the vertical hub. DFit (right) simplifies puling needs and allows for the continuation of the conduit with no acute directional changes (green).

Mitigating liquid and vapor condensate

The benefits of the DFit design are not the only advantages. Testing has proven the DFit has superior strength and is much more corrosion resistant than the typical T body condensate/liquid drains. The Dfit reduces the points for potential liquid and condensate infiltrations in raceways and reduces threading or potential threading failures. Trials show DFit drains quicker than that of the T body and returns/ out flows a greater volume of liquid than that of the T body in identical systems. The DFit is easy to maintain, clean and the screen replacement is simple.

The DFit significantly outperforms the traditional condensate/liquid drain applications in raceways systems and makes the traditional applications obsolete.

Manufacturing, shipping and storage

Materials

DFit can be manufactured using any of the standard materials found in the electrical industry. The difference in its size and weight compared to that of the traditional condensate/liquid drain options, greatly reduces manufacturing costs associate with material procurement. Additionally, manufacturing time is greatly reduced because of its monolithic design which requires

only single casts and forms. This leads to less total material, simplified molding and machining requirements. Thus, lower production time and costs.

With the simplified production/machining processes, the DFit component should offer a competitive advantage in value creation by significantly increasing available product margins, when compared to the current installation system.

Size and weight

DFit serves the same purpose with improved results, while being compact and weighing less. This significantly reduces the costs of shipping, freight and storage. This includes handling labor from the supplier at delivery and during installation. These savings benefit manufacturers, suppliers, contractors and clients. On many jobsites, contractors use one or multiple material trailers where their installation materials are stored (Figure 7). Reducing the space needed for onsite storage and component count is another benefit to contractors under pressure to complete work on time and on budget.

Figure 7. An example of a jobsite storage trailer for an electrical contractor.

To highlight the differences a comparison of a TB body and drain fitting and the equivalent DFit alternative is provided below. The difference in size and weight will be similar irrespective of material and trade size as long as the equivalent is used in comparison.

	DFit + screen & ring clip	**TB body** + gasket, cover & drain fitting
Material	steel	steel
Weight	8.80 oz 0.55 lbs	48.0 oz 3.00 lbs
Trade size	¾ inch	¾ inch
Length (end to end)	2.68 in	6.25 in

Closing Remarks

DMan Enterprise Corp.

In 2015 Denny Mansell created DMan Enterprise Corp. with the goal of solving an industry-wide problem. The culmination of his efforts resulted in the conception, novel design, creation and patent of a drain fitting that revolutionizes electrical raceways installations. His colleagues have coined it as 'the future' of condensate/liquid drain fittings,

Industry leaders, electrical engineers, fitting manufactures, IEC manufacturers and wholesalers are invited to contact DMan Enterprise directly at EYashinski.DManEnt@gmail.com or by visiting DManEnterprise.com.

Don't let 'the future' pass you by. Contact DMan today to discuss how you can add DFit to your business.

Acknowledgements

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References

[1] NFPA 70, *2014 National Electrical Code,* Quincy, MA: NFPA; (225.22, 230.53),

[2] NFPA 70, *2014 National Electrical Code,* Quincy, MA: NFPA; (300.34)

[3] US Patent Office, *Electrical Raceway Drain Fitting, US Patent Number:* 9,722,403 B2, August 1, 2017. Katy, TX.

[4] NFPA 70, *2014 National Electrical Code,* Quincy, MA: NFPA; (300.34)

For more information about DFit visit:
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