

# **Smoother** Cable Pulls and **Simpler** Installations with **FLX-1™ Technology**

Cable installation is the critical first step to deploying any structured cabling system, and though standards and best practices help to ensure network quality, the cable jacket itself is the first line of defense against the loss of performance.

During installation, cable products are constantly put under mechanical stress from being dragged, bundled, pulled in conduit, bent in tight spaces, or simply pulled from its packaging. Product with poor flexibility leads to greater cable recoil memory, burdens handling and slows the installation. In some cases, cables are prone to kinking, which can lead to permanent stress marks and notable deformations of the cable jacket. This can become pronounced in plenum LAN cables, which are often stiff due to the high amount of flame retardant filler used in the jacket material to meet the NFPA 262 Fire Safety test.

To address these issues, the product development and materials engineering teams at Leviton performed extensive R&D work to develop an advanced polymer jacket compound technology called FLX-1. This technology — used with select Berk-Tek plenum cables — creates a more flexible cable that is easier to work with at room and cold temperatures, exhibits less recoil memory, and fewer stress marks. Introduced during the jacketing process using state-of-the-art manufacturing equipment, FLX-1 technology creates a streamlined installation experience that can't be found with other cables.

## Testing that Replicates the Real World

At Leviton’s R&D facility in New Holland, PA, engineers tested several Berk-Tek cable designs using the FLX-1 technology alongside several competitive equivalents in a live environment, replicating robust installation. Leviton cables’ ability to flex and stress under mechanical strain outperformed their competitors in three areas: Flex Loop Test, White Stress Mark Test, and Cable Recoil Test.

The cable **Flex Loop Test** is a quantitative method developed by Leviton’s engineering team to characterize the flexibility of a cable by measuring the compression resistance of a sample set in a loop (Figure 1). Lower compression resistance indicates higher cable flexibility and makes the product easier to work with in the field.

The **White Stress Mark Test** is a qualitative method developed by Leviton’s product development team to characterize the prominence of white stress marks that appear on the cable jacket. The test involves fully bending a cable sample around a mandrel of the cable’s minimum bend radius (in Figure 2).

After bending the cable sample around the mandrel, the outer jacket is inspected to determine the level of stress marks present. There are 5 levels of stress marks, from Level 1 indicating no visible stress mark on the jacket, to Level 5 for multiple and very pronounced stress marks on both sides of the jacket (Figure 3). It is important to note that the stress marks are cosmetic only and do not impact the electrical transmission performance of the cable.

The **Cable Recoil Test** is a quantitative method that characterizes the recoil memory of a cable when deployed from its box or reel (Figure 4). This parameter is important since it is correlated with the cables tendency to self-align into a loop and form a kink when pulled. With FLX-1 technology, cables can be installed faster without having to stop and work out loops or kinks.



Figure 1: A highly specialized piece of equipment measures the Pound Force (LbF) exerted onto the cable sample

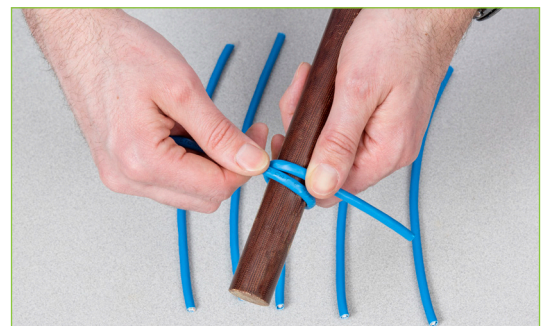


Figure 2: Cable Samples bent to their minimum bend radius

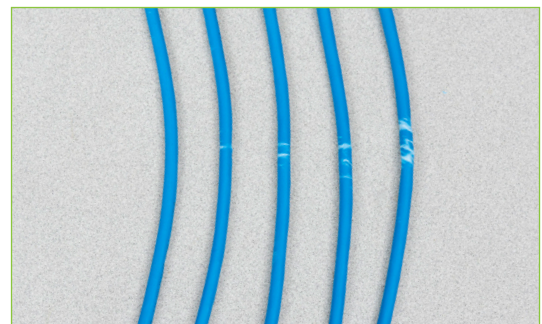


Figure 3: Stress Mark Level 1 through Level 5 (from left to right)

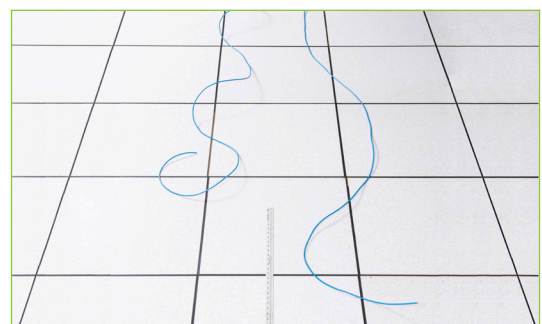


Figure 4: Cable recoil test

## Test Results

When compared to competitor cables, Berk-Tek cables with FLX-1 Technology ranked at the top in nearly every category among Plenum LAN Category cables, with superior flexibility at room and cold temperatures, reduced stress whitening and reduced recoil memory. The test results are shown in Tables 1, 2, and 3 below.

Table 1

Category 6 Cable Flexibility Test Results (smaller numbers = higher flexibility, less stress mark, less recoil memory)						
Cable Description	Berk-Tek LANmark-1000 FLX-1	Competitor A	Competitor B	Competitor C	Competitor D	Competitor E
Flex Loop, Lbf	1.16	1.20	2.11	1.49	1.22	1.14
Stress Mark Level	1.2	1.4	1.2	1.2	3.4	3.2
Recoil Memory, 20°C	40"	44"	55"	26"	64"	45"
Recoil Memory, 0°C	68"	70"	91"	57"	95"	76"

Table 2

Category 6A Cable Flexibility Test Results (smaller numbers = higher flexibility, less stress mark, less recoil memory)				
Cable Description	Berk-Tek LANmark-SST FLX-1	Competitor A	Competitor B	Competitor C
Flex Loop, Lbf	2.52	5.12	3.37	4.35
Stress Mark Level	1.2	2.8	1.0	1.5
Recoil Memory, 20°C	7"	15"	24"	20"
Recoil Memory, 0°C	42"	49"	67"	38"

Table 3

Category 6A Reduced Diameter Cable Flexibility Test Results (smaller numbers = higher flexibility, less stress mark, less recoil memory)			
Cable Description	Berk-Tek LM-RDT FLX-1	Competitor A	Competitor B
Flex Loop, Lbf	2.15	3.13	2.38
Stress Mark Level	1.1	1.2	1.5
Recoil Memory, 20°C	10"	14"	14"
Recoil Memory, 0°C	56"	41"	53"

The choice of jacketing material used in data cable is critical to guarantee ease of handling and installation. Berk-Tek cable with FLX-1 Technology is the best in its category with very good flexibility and limited stress marking when subjected to bending. FLX-1 significantly improves cable flexibility to reduce kinking and payout issues, allowing for smoother cable pulls. This translates into a faster, easier, and more efficient installation experience.

FLX-1 technology is currently available with these Berk-Tek cables:

- LANmark™-SST Cat 6A UTP Plenum Cable
- LM-RDT™ Cat 6A UTP Plenum Cable
- LANmark™-1000 Cat 6 UTP Plenum Cable

Learn more at [Leviton.com/FLX-1](https://Leviton.com/FLX-1)