

## ENVIRONMENTAL PRODUCT DECLARATION

# BELDEN FIBER OPTIC CABLE

PLENUM RATED



Belden Plenum Fiber Optic Cabling



At Belden, our core values include customers defining our success, and continuously improving. These are rooted in our culture and everyday business practices. These values provide the foundation of our commitment to corporate responsibility, human rights, environmental stewardship, employee health and safety, ethical business practices, philanthropy and equal opportunity.

As we continue to pursue transparency throughout our business operations, we are focused on the three pillars of sustainability: social, environmental, and economic factors.

To succeed with our customers we need to listen to our customers. Producing transparency documents is a priority and a significant part of our sustainability initiative.

As continuously improving is our way of life, the life cycle analysis data used in this report is carefully evaluated and interpreted, guiding our future product development strategy and manufacturing practices.



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This document includes Belden’s plenum rated fiber optic cables including: Distribution, Armored Distribution, & Breakout families.

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment	
DECLARATION HOLDER	Belden	
DECLARATION NUMBER	4787524121.105.1	
DECLARED PRODUCT	Plenum Rated Fiber Cable	
REFERENCE PCR	PCR for EPDs: Wire & Cable PCR 2013:1.0	
DATE OF ISSUE	January 19, 2017	
PERIOD OF VALIDITY	5 years	
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by:	Environment and Development Foundation	
	PCR Addendum: UL Environment	
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL		
	Wade Stout, ULE EPM	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		
	Thomas Gloria, Life-Cycle Services, LLC	

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## Product Definition and Information

### Company Description

For more than 100 years, customers who have required unsurpassed performance and durability for signal transmission have counted on the Belden brand. In the 20th century that trust was built on high-performance wire and cable products. Today, Belden designs, manufactures and sells a comprehensive portfolio of cable, connectivity and networking products for the transmission of signals for data, sound and video applications.

Belden has a recognized reputation for doing business in a responsible and ethical manner. As we continue to pursue sustainability throughout our business operations, we are focused on the triple bottom line: social, environmental, and financial factors. One of our commitments is to innovate and continue to offer environmentally-friendly and LEED certified products to customers looking for sustainable alternatives to traditional products. This declaration is part of that commitment.

### Product Description

More than 200 fiber optic cable products are listed below with their definitions and part number codes. The list includes various CMP (Plenum) rated items. Their constructions include tight buffer armored and non-armored designs. For each product design, items for OM1, OM2, OM3, OM4, and OS2 (singlemode) are available. Belden fiber products are third party tested by either ETL or UL and approved for use according to the National Electric Code. All are available in a variety of packaging types including plastic reels and reel-in-boxes. The tables below include the standard Belden offering. Please consult your Belden representative to see if any additional non-standard products are included.

The following list is divided up as follows:

1. Distribution Fiber Optic Cables
2. Armored Distribution Fiber Optic Cables
3. Breakout Fiber Optic Cables

#### 1. Distribution Cables

Distribution cables are designed for fast installation and easy termination. Sub-unitized cables provide easy routing and 900µm tight-buffered fiber supports fast and robust field-termination.

- **Indoor UL Type OFNP / C(UL) OFNP FT6**
  - Available in 2 to 96 fiber counts.
  - Part numbers include:

No. of Fibers	OM1	OM2	OM3	OM4		OS2 Singlemode
				Erika Violet	Aqua	
2	FI1D002P9	FI2D002P9	FI3D002P9	FI4D002P9	FI4D002P9A	FISD002P9
4	FI1D004P9	FI2D004P9	FI3D004P9	FI4D004P9	FI4D004P9A	FISD004P9
6	FI1D006P9	FI2D006P9	FI3D006P9	FI4D006P9	FI4D006P9A	FISD006P9
8	FI1D008P9	FI2D008P9	FI3D008P9	FI4D008P9	FI4D008P9A	FISD008P9
12	FI1D012P9	FI2D012P9	FI3D012P9	FI4D012P9	FI4D012P9A	FISD012P9
24	FI1D024P9	FI2D024P9	FI3D024P9	FI4D024P9	FI4D024P9A	FISD024P9
36	FI1D036PK	FI2D036PK	FI3D036PK	FI4D036PK	FI4D036PKA	FISD036PK
48	FI1D048PK	FI2D048PK	FI3D048PK	FI4D048PK	FI4D048PKA	FISD048PK

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No. of Fibers	OM1	OM2	OM3	OM4		OS2 Singlemode
				Erika Violet	Aqua	
72	FI1D072PK	FI2D072PK	FI3D072PK	FI4D072PK	FI4D072PKA	FISD072PK
96	FI1D096PK	FI2D096PK	FI3D096PK	FI4D096PK	FI4D096PKA	FISD096PK

- **Indoor/Outdoor UL Type OFNP / C(UL) OFNP FT6**
  - Available in 2 to 144 fiber counts.
  - Part numbers include:

No. of Fibers	OM1	OM2	OM3	OM4	OS2 Singlemode
2	FD1D002P9	FD2D002P9	FD3D002P9	FD4D002P9	FDSD002P9
4	FD1D004P9	FD2D004P9	FD3D004P9	FD4D004P9	FDSD004P9
6	FD1D006P9	FD2D006P9	FD3D006P9	FD4D006P9	FDSD006P9
12	FD1D012P9	FD2D012P9	FD3D012P9	FD4D012P9	FDSD012P9
24	FD1D024P9	FD2D024P9	FD3D024P9	FD4D024P9	FDSD024P9
24	FD1D024PJ	FD2D024PJ	FD3D024PJ	FD4D024PJ	FDSD024PJ
36	FD1D036PJ	FD2D036PJ	FD3D036PJ	FD4D036PK	FDSD036PJ
48	FD1D048PK	FD2D048PK	FD3D048PK	FD4D048PK	FDSD048PK
72	FD1D072PK	FD2D072PK	FD3D072PK	FD4D072PK	FDSD072PK
96	FD1D096PK	FD2D096PK	FD3D096PK	FD4D096PK	FDSD096PK
144	FD1D144PK	FD2D144PK	FD3D144PK	FD4D144PK	FDSD144PK

## 2. **Armored Distribution Cables**

Armored distribution cables provide heightened protection with simple termination. These cables combine the easy termination of a distribution cable with interlocking armor to provide an elevated resistance to cutting, crushing, and the gnawing of rodents all while eliminating the additional expense of innerduct.

- **Indoor UL Type OFCP/ C(UL) OFCP FT6**
  - Available in 6 to 144 fiber counts.
  - Part numbers include:

No. of Fibers	OM1	OM2	OM3	OM4		OS2 Singlemode
				Erika Violet	Aqua	
6	FI1D006A9	FI2D006A9	FI3D006A9	FI4D006A9	FI4D006A9A	FISD006A9
12	FI1D012A9	FI2D012A9	FI3D012A9	FI4D012A9	FI4D012A9A	FISD012A9
24	FI1D024A9	FI2D024A9	FI3D024A9	FI4D024A9	FI4D024A9A	FISD024A9
24	FI1D024AJ	FI2D024AJ	FI3D024AJ	FI4D024AJ	FI4D024AJA	FISD024AJ
36	FI1D036AJ	FI2D036AJ	FI3D036AJ	FI4D036AJ	FI4D036AJA	FISD036AJ
48	FI1D048AK	FI2D048AK	FI3D048AK	FI4D048AK	FI4D048AKA	FISD048AK
72	FI1D072AK	FI2D072AK	FI3D072AK	FI4D072AK	FI4D072AKA	FISD072AK

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No. of Fibers	OM1	OM2	OM3	OM4		OS2 Singlemode
				Erika Violet	Aqua	
96	FI1D096AK	FI2D096AK	FI3D096AK	FI4D096AK	FI4D096AKA	FISD096AK
144	FI1D144AK	FI2D144AK	FI3D144AK	FI4D144AK	FI4D144AKA	FISD144AK

- **Indoor/Outdoor UL Type OFCP/ C(UL) OFCP FT6**

- Available in 6 to 72 fiber counts.
- Part numbers include:

No. of Fibers	OM1	OM2	OM3	OM4	OS2 Singlemode
6	FD1D006A9	FD2D006A9	FD3D006A9	FD4D006A9	FDSD006A9
12	FD1D012A9	FD2D012A9	FD3D012A9	FD4D012A9	FDSD012A9
24	FD1D024A9	FD2D024A9	FD3D024A9	FD4D024A9	FDSD024A9
24	FD1D024AJ	FD2D024AJ	FD3D024AJ	FD4D024AJ	FDSD024AJ
36	FD1D036AJ	FD2D036AJ	FD3D036AJ	FD4D036AJ	FDSD036AJ
48	FD1D048AK	FD2D048AK	FD3D048AK	FD4D048AK	FDSD048AK
72	FD1D072AK	FD2D072AK	FD3D072AK	FD4D072AK	FDSD072AK

### 3. **Breakout Cables**

Breakout cables provide robust terminations in demanding environments. These cables provide all the ease of 900µm tight buffered termination with only one fiber per sub-unit. This enables the ultimate bond between the connector and the cables' Aramid yarns resulting in unmatched strength and durability.

- **2.0mm Subunit - UL Type OFNP / C(UL) OFNP FT6**

- Available in 2 to 12 fiber counts.
- Part numbers include:

No. of Fibers	OM1	OM2	OM3	OM4		OS2 Singlemode
				Erika Violet	Aqua	
2	FI1B002PB	FI2B002PB	FI3B002PB	FI4B002PB	FI4B002PBA	FISB002PB
4	FI1B004PB	FI2B004PB	FI3B004PB	FI4B004PB	FI4B004PBA	FISB004PB
6	FI1B006PB	FI2B006PB	FI3B006PB	FI4B006PB	FI4B006PBA	FISB006PB
10	FI1B010PB	FI2B010PB	FI3B010PB	FI4B010PB	FI4B010PBA	FISB010PB
12	FI1B012PB	FI2B012PB	FI3B012PB	FI4B012PB	FI4B012PBA	FISB012PB

### Manufacturing Locations

These fiber cables are manufactured in Nogales, Mexico. Primary data for the life cycle assessment has been provided by this facility for the calendar year 2016.

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## Applications and Uses

These products are used in the plenum spaces of buildings. Applications for these products include In-building backbones, Indoor/Outdoor direct burial, telecommunications and data trunks.

## Material Inputs

The raw materials for these plenum fiber cables are listed in Table 1. Table 2 details the average packaging materials associated with each product. Table one is a reference to convert to SI units.

Conversion	Lbs.	Kg
<b>Pounds to Kilograms</b>	1	0.4536

Table 1: SI Unit Conversion (0.4536kg/lb.)

Component (lbs/100 ft)	Distribution		DJ, IA Distribution		Breakout
	FISD096PK	FD3D144PK	F13D144AK	FSD072AK	FISB012PB
<b>Jacket</b>	7.15	11.81	26.27	11.59	2.75
<b>Jacket Colorant</b>	0.47	0.52	0.71	0.37	0.10
<b>Aramid</b>	1.78	2.77	2.65	1.37	0.61
<b>Aramid Jacket</b>	-	-	-	-	-
<b>Armor</b>	-	-	15.60	10.86	-
<b>Central Strength Member</b>	0.48	0.16	0.16	0.48	0.76
<b>CSM Jacket</b>	7.81	-	-	2.74	2.39
<b>Tape</b>	0.20	0.70	0.43	0.32	-
<b>Filler</b>	-	-	-	-	-
<b>Ripcord</b>	-	-	-	-	-
<b>Buffer</b>	6.18	9.25	9.22	4.61	0.77
<b>Buffer Colorant</b>	-	-	-	-	-
<b>Fiber</b>	0.46	0.69	0.69	0.34	0.06
<b>Inner Jacket</b>	8.41	12.63	12.58	6.26	2.12
<b>Fiber Colorant</b>	-	-	-	-	-
<b>Total</b>	<b>32.93</b>	<b>38.52</b>	<b>68.30</b>	<b>38.94</b>	<b>9.56</b>

Table 2: Material Inputs for Plenum Fiber Cables (lbs/100 ft)



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Component (lbs/100ft)	Distribution		DJ, IA Distribution		Breakout
	FISD096PK	FD3D144PK	FI3D144AK	FDSD072AK	FISB012PB
Wood Pallets	<0.01	0.01	0.01	0.01	<0.01
Wood Reels	0.01	0.01	0.02	0.01	<0.01
Foam Wrap	<0.01	<0.01	<0.01	<0.01	<0.01
Stretch Wrap	<0.01	<0.01	<0.01	<0.01	<0.01
Corrugated pads	<0.01	<0.01	<0.01	<0.01	<0.01
Labels	<0.01	<0.01	<0.01	<0.01	<0.01

Table 4: Average Packaging Material Inputs

## Manufacturing Process

To manufacture fiber optic cable, glass fiber is extruded with a tight buffer surrounding the fiber. The buffered fiber is water-cooled and dried. Depending on the fiber optic cable product, fibers are then stranded with strength members, aramid yarn and sometimes gel, and a sheath or jacket is extruded around the strands. The sheathed fiber is subsequently water-cooled and inspected. For products that are armored, the armor is then applied, and a jacket is extruded around the armor. The final product is then packaged and shipped for distribution.

## Life Cycle Assessment Description

### Functional Unit

Environmental impacts are reported per functional unit of a product and the functional unit is the basis for comparison in an LCA. For fiber cable, the functional unit is 100 feet of cable.

### Life Cycle Stages Assessed

Life Cycle Boundary	EPD Life Cycle Stage
Belden Plenum Fiber Cable Business-to-Business	Raw Material Acquisition
	Manufacturing
	Packaging/Storage
Belden Plenum Fiber Cable Business-to-Consumer	Marketing and Distribution
	Installation and Use
	Waste Disposal

Table 5: Life Cycle Stages Assessed

### System Boundary

This project considers the life cycle activities from resource extraction through installation and end-of-life effects. The boundary covers raw material acquisition, manufacturing, marketing, use and waste disposal as seen in Figure 1.

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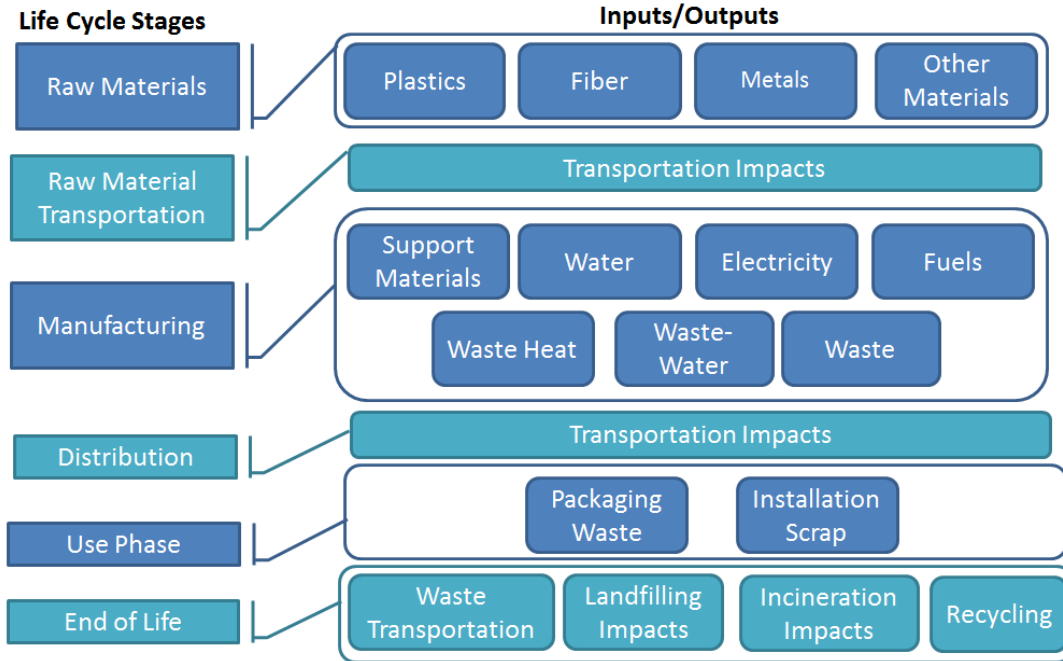


Figure 1: System Boundary

## Allocation

Allocation for manufacturing energy, water, and waste items was conducted per length of production based on allocation of resources per product groups produced at each facility.

## Cut-off Criteria

For any impact category, should the sum of various impacts from a specific process/activity be less than 1% of the impact equivalent in that category, the process/activity may be neglected during the inventory analysis. Nonetheless, the accumulated impact of neglected process/activity may not exceed 5%. Components and materials omitted from the LCA shall be documented.

This EPD is in compliance with the cut-off criteria. Components and materials omitted from the LCA shall be documented and include installation energy from signal testing devices in the installation of fiber cable. Capital items for the production processes (machines, buildings, etc.) were not taken into consideration.

## Period under Consideration

Primary data used refer to the production processes of the manufacturing facility and were derived from calendar year 2016.



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## Software and Background Data

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SimaPro v8.02 Software System for Life Cycle Engineering, an internationally recognized LCA modeling software program, was used for life cycle impact assessment modeling. Background and secondary datasets were modeled using the US LCI database, developed by the National Renewable Energy Laboratory, as well as the ecoinvent v3 database, which is developed by the Swiss Centre for Life Cycle Inventories.

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## Marketing and Distribution

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The plenum fiber cable products are distributed globally, but primarily throughout the United States and Canada. The final products were modeled as being shipped 500 miles (800 kilometers) by truck, based on the location of Belden manufacturing location and distribution center.

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## Transportation

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Belden provided resource transportation mode and location data to support the calculation of raw material transportation flows. The transportation LCI data from the US LCI database (kg-km basis) were used to develop the resource transportation LCI profile.

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## Installation and Use Stage

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Based on industry expertise from Belden, a scrap rate of 5% was assumed in the installation of the product in the use stage for this study. This rate was based on the expertise of Belden. In some installations, cables may be hung on J-hooks or attached to a surface with Velcro. However, in many cases the cable is simply laid with no attachment. Thus no J-hooks, Velcro, or other attachment materials were included in the boundary. The cables often connect to outlets installed in a wall or floor. These outlets were considered a separate product system and not included in the boundary of this study. No other materials are required for installation.

Fiber cable is considered a passive product after installation and during the use stage, meaning no energy is consumed during the products' use. Therefore, no use stage impacts were measured, and thus none are presented in these results. No maintenance is required. The lifetimes of these products may vary and fiber cable is replaced more commonly due to increased bandwidth and data speed requirements, and not because of product performance or degradation.

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## End-of-Life

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A distance of 20 miles to the recycling facility was assumed for products at the end-of-life. End-of-life disposition was modeled after the average US municipal solid waste disposition, as cited in a study conducted by DuPont (Krieger, 2007). The US disposition rates of 82% landfill and 18% incineration were assumed for modeling. The cut-off methodology (also known as the recycled content method) was used for any materials that were sent to recycling such as scrap and the end-of-life disposition. This methodology assumes the processing of the recycled material at the recycler will be applied to the next product life cycle. Data not available in life cycle databases used models found in the Waste Reduction Model (WARM), developed by the US EPA.

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## Life Cycle Inventory

### Energy Use

The following table and figure details the cumulative energy demand of the Belden non-plenum copper cables through each life cycle stage of the product.

Energy per Life Cycle Stage (MJ/100 ft)	Distribution		DJ, IA Distribution		Breakout
	FISD096PK	FD3D144PK	FI3D144AK	FDSD072AK	FISB012PB
<b>Materials</b>	2.0E+03	1.9E+03	2.9E+03	1.7E+03	4.1E+02
<b>Manufacturing</b>	4.2E+03	5.0E+03	8.8E+03	5.0E+03	1.2E+03
<b>Marketing</b>	6.3E+01	7.3E+01	1.3E+02	7.4E+01	1.8E+01
<b>Use</b>	3.1E+02	3.5E+02	5.9E+02	3.4E+02	8.3E+01
<b>Waste Disposal</b>	5.3E+00	6.2E+00	1.1E+01	6.3E+00	1.5E+00
<b>Cradle to Grave</b>	<b>6.6E+03</b>	<b>7.3E+03</b>	<b>1.2E+04</b>	<b>7.2E+03</b>	<b>1.7E+03</b>

Table 6: Cradle to Grave Cumulative Energy Demand (MJ) per 100 feet of Cable

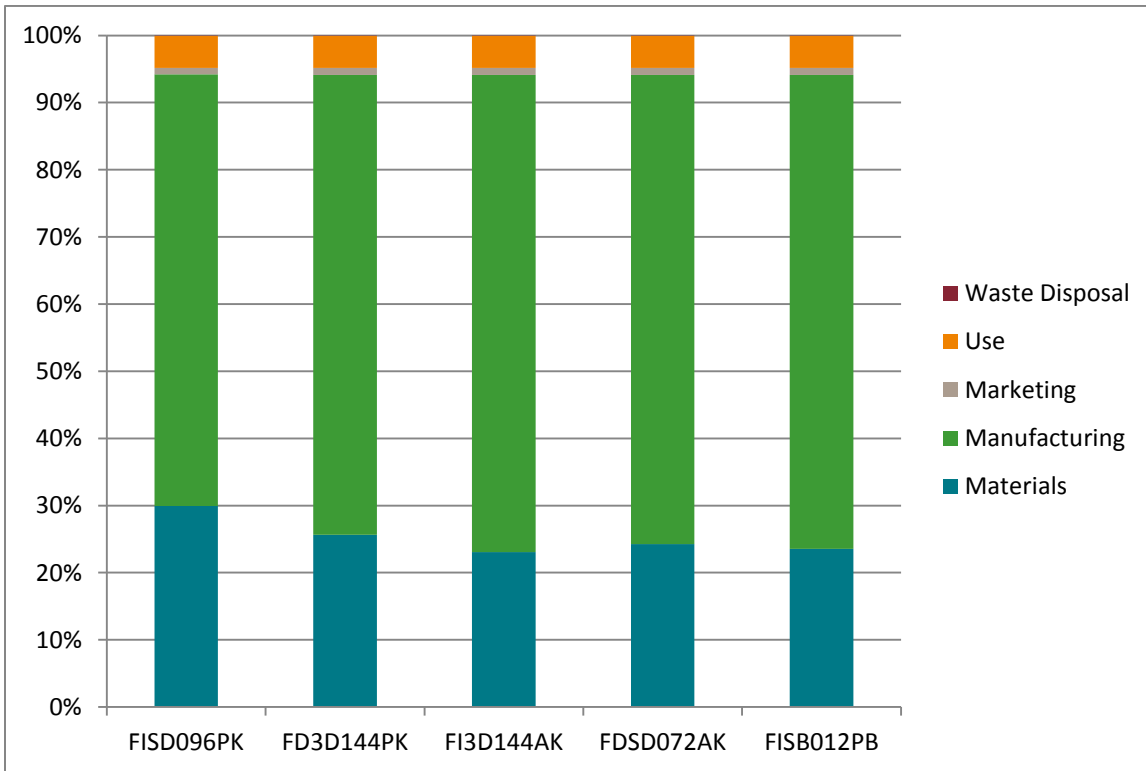


Figure 2: Cradle to Grave Cumulative Energy Demand

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## Waste Management

Methods of waste handling are detailed for the Belden non-plenum copper cables for the entire life cycle of the products per 100 feet of cable.

Energy per Life Cycle Stage (MJ/100 ft)	Distribution		DJ, IA Distribution		Breakout
	FISD096PK	FD3D144PK	FI3D144AK	FDSD072AK	FISB012PB
<b>Incineration (with and without energy recovery)</b>	3.0E+00	3.5E+00	6.2E+00	3.5E+00	8.7E-01
<b>Landfill (nonhazardous waste)</b>	1.9E+01	2.1E+01	3.6E+01	2.1E+01	5.1E+00
<b>Hazardous Waste</b>	1.0E-02	1.2E-02	6.7E-01	4.6E-01	2.7E-03
<b>Landfill Avoidance (recycling)</b>	8.8E+00	1.0E+01	1.8E+01	1.0E+01	2.5E+00

Table 7: Cradle to Grave Waste

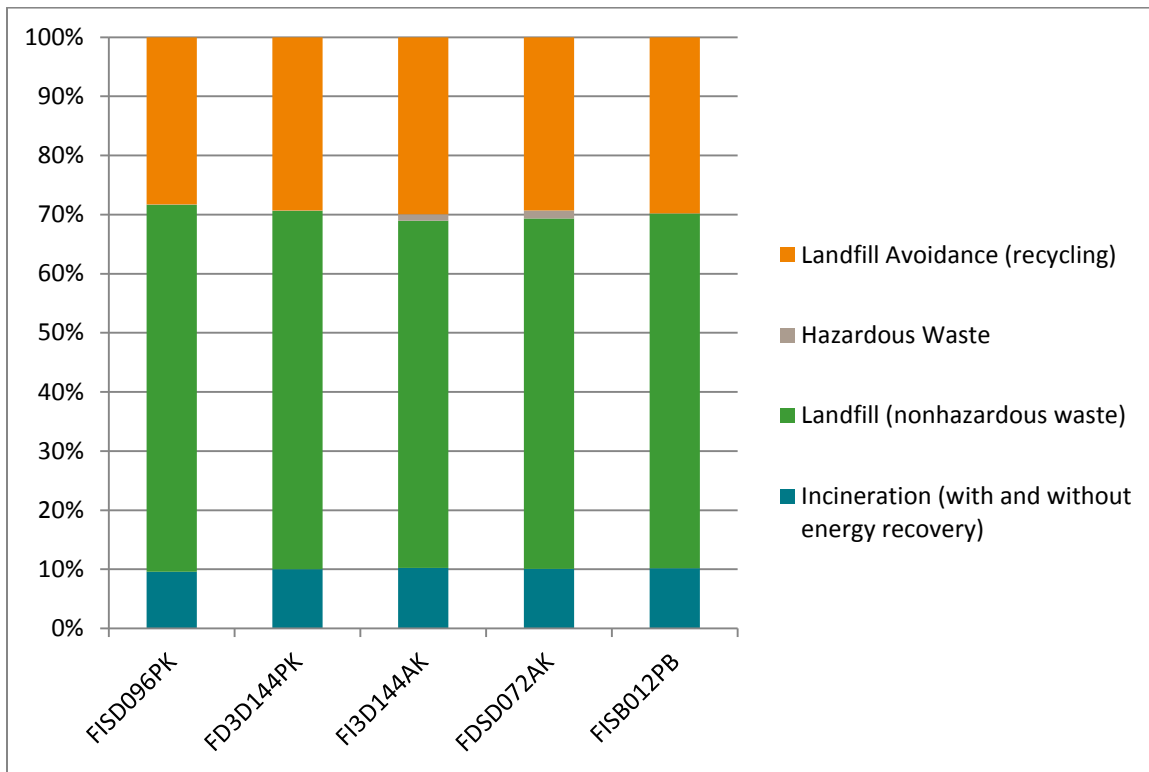


Figure 3: Cradle to Grave Waste

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## Life Cycle Impact Assessment

The environmental impacts listed below were assessed throughout the life cycle of the plenum fiber cable products as defined above, per 100 feet of cable. The environmental impacts were analyzed using TRACI 2.1 methodology.

Impact Category	FISD096PK						FD3D144PK					
	Raw Material	Manu- facturing	Mark- eting	Use	Waste Disposal	Cradle to Grave	Raw Material	Manu- facturing	Mark- eting	Use	Waste Disposal	Cradle to Grave
Global Warming (kg CO <sub>2</sub> eq)	1.4E+02	2.8E+02	4.4E+00	2.1E+01	1.7E+00	<b>4.5E+02</b>	1.3E+02	3.3E+02	5.2E+00	2.3E+01	2.0E+00	<b>4.9E+02</b>
Fossil Fuel Depletion (MJ surplus)	1.6E+02	5.3E+02	6.1E+00	3.5E+01	5.9E-01	<b>7.4E+02</b>	1.6E+02	6.3E+02	7.2E+00	4.0E+01	6.9E-01	<b>8.3E+02</b>
Eutrophication (kg N eq)	4.4E-01	9.3E-02	1.2E-03	2.7E-02	5.1E-03	<b>5.7E-01</b>	3.7E-01	1.1E-01	1.4E-03	2.5E-02	6.0E-03	<b>5.1E-01</b>
Smog (kg O <sub>3</sub> eq)	5.6E+00	1.0E+01	5.5E-01	8.3E-01	6.8E-02	<b>1.7E+01</b>	5.3E+00	1.2E+01	6.5E-01	9.1E-01	7.9E-02	<b>1.9E+01</b>
Acidification (kg SO <sub>2</sub> eq)	6.8E-01	1.3E+00	3.0E-02	1.0E-01	2.6E-03	<b>2.1E+00</b>	6.2E-01	1.5E+00	3.5E-02	1.1E-01	3.0E-03	<b>2.3E+00</b>
Ozone Depletion (kg CFC <sub>11</sub> eq)	2.7E-05	1.4E-05	1.9E-08	2.1E-06	6.1E-08	<b>4.3E-05</b>	3.4E-05	1.7E-05	2.2E-08	2.5E-06	7.1E-08	<b>5.3E-05</b>
Impact Category	FI3D144AK						FDS072AK					
	Raw Material	Manu- facturing	Mark- eting	Use	Waste Disposal	Cradle to Grave	Raw Material	Manu- facturing	Mark- eting	Use	Waste Disposal	Cradle to Grave
Global Warming (kg CO <sub>2</sub> eq)	1.8E+02	5.8E+02	9.2E+00	3.8E+01	3.5E+00	<b>8.0E+02</b>	1.1E+02	3.3E+02	5.3E+00	2.2E+01	2.0E+00	<b>4.7E+02</b>
Fossil Fuel Depletion (MJ surplus)	2.7E+02	1.1E+03	1.3E+01	6.9E+01	1.2E+00	<b>1.5E+03</b>	1.6E+02	6.3E+02	7.3E+00	4.0E+01	7.0E-01	<b>8.4E+02</b>
Eutrophication (kg N eq)	4.1E-01	1.9E-01	2.5E-03	3.1E-02	1.1E-02	<b>6.4E-01</b>	2.8E-01	1.1E-01	1.5E-03	2.0E-02	6.1E-03	<b>4.1E-01</b>
Smog (kg O <sub>3</sub> eq)	7.5E+00	2.2E+01	1.1E+00	1.5E+00	1.4E-01	<b>3.2E+01</b>	4.7E+00	1.2E+01	6.6E-01	8.9E-01	8.0E-02	<b>1.9E+01</b>
Acidification (kg SO <sub>2</sub> eq)	8.6E-01	2.7E+00	6.3E-02	1.8E-01	5.3E-03	<b>3.8E+00</b>	5.5E-01	1.6E+00	3.6E-02	1.1E-01	3.0E-03	<b>2.3E+00</b>
Ozone Depletion (kg CFC <sub>11</sub> eq)	3.6E-05	3.0E-05	3.8E-08	3.3E-06	1.3E-07	<b>6.9E-05</b>	2.0E-05	1.7E-05	2.2E-08	1.8E-06	7.2E-08	<b>3.9E-05</b>
Impact Category	FISB012PB											
	Raw Material	Manu- facturing	Mark- eting	Use	Waste Disposal	Cradle to Grave						
Global Warming (kg CO <sub>2</sub> eq)	2.8E+01	8.1E+01	1.3E+00	5.6E+00	4.9E-01	<b>1.2E+02</b>						
Fossil Fuel Depletion (MJ surplus)	3.6E+01	1.6E+02	1.8E+00	9.6E+00	1.7E-01	<b>2.0E+02</b>						
Eutrophication (kg N eq)	7.7E-02	2.7E-02	3.6E-04	5.4E-03	1.5E-03	<b>1.1E-01</b>						
Smog (kg O <sub>3</sub> eq)	1.2E+00	3.0E+00	1.6E-01	2.2E-01	2.0E-02	<b>4.6E+00</b>						
Acidification (kg SO <sub>2</sub> eq)	1.4E-01	3.8E-01	8.7E-03	2.6E-02	7.5E-04	<b>5.6E-01</b>						
Ozone Depletion (kg CFC <sub>11</sub> eq)	8.3E-06	4.2E-06	5.4E-09	6.2E-07	1.8E-08	<b>1.3E-05</b>						

Table 8: Cradle to Grave Life Cycle Impact Assessment Results per 100 ft of Cable Continued

# ENVIRONMENTAL PRODUCT DECLARATION



This document includes Belden's plenum rated fiber optic cables including: Distribution, Armored Distribution, & Breakout families.

According to ISO 14025

## References

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- ANSI/TIA-568-C.2 Commercial Building Telecommunications Cabling
- C22.2 NO. 214-08 (R2013) - Communications cables (Bi-national standard, with UL 444)
- ISO 21930: Sustainability in building construction – Environmental declaration of building products
- EPA, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)
- EPA, Wire and Cable Insulation and Jacketing: Life-Cycle Assessments for Selected Applications, June 2008, EPA 744-R-08-001
- FTC Part 260, Green guides
- (ILCD, 2010) Joint Research Commission, 2010, ILCD Handbook: General Guide for Life Cycle Assessment
- Intergovernmental Panel on Climate Change (IPCC)
- ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*
- ISO 14040:2006 *Environmental management - Life cycle assessment – Principles and framework*
- ISO 14044:2006 *Environmental management - Life cycle assessment – Requirements and guidelines*
- NFPA 262: Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
- NFPA 70®: National Electrical Code
- UL 44 Standard Thermoset-Insulated Wires and Cables
- UL 1666 Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
- USEPA Waste Reduction Model (WARM)
- Krieger, T. et al. *New Fire Hazard and Environmental Burden Evaluations of Electrical Cable Installations Utilizing ISO 14040 Environmental Methodologies*. DuPont. November 10, 2007.

## LCA Development

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This EPD and corresponding LCA were prepared by Sustainable Solutions Corporation of Royersford, Pennsylvania.



## Contact Belden

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For more information, please visit <http://www.belden.com/>, or contact Technical Support at <http://info.belden.com/contact/> or 1-800-235-3361.

