





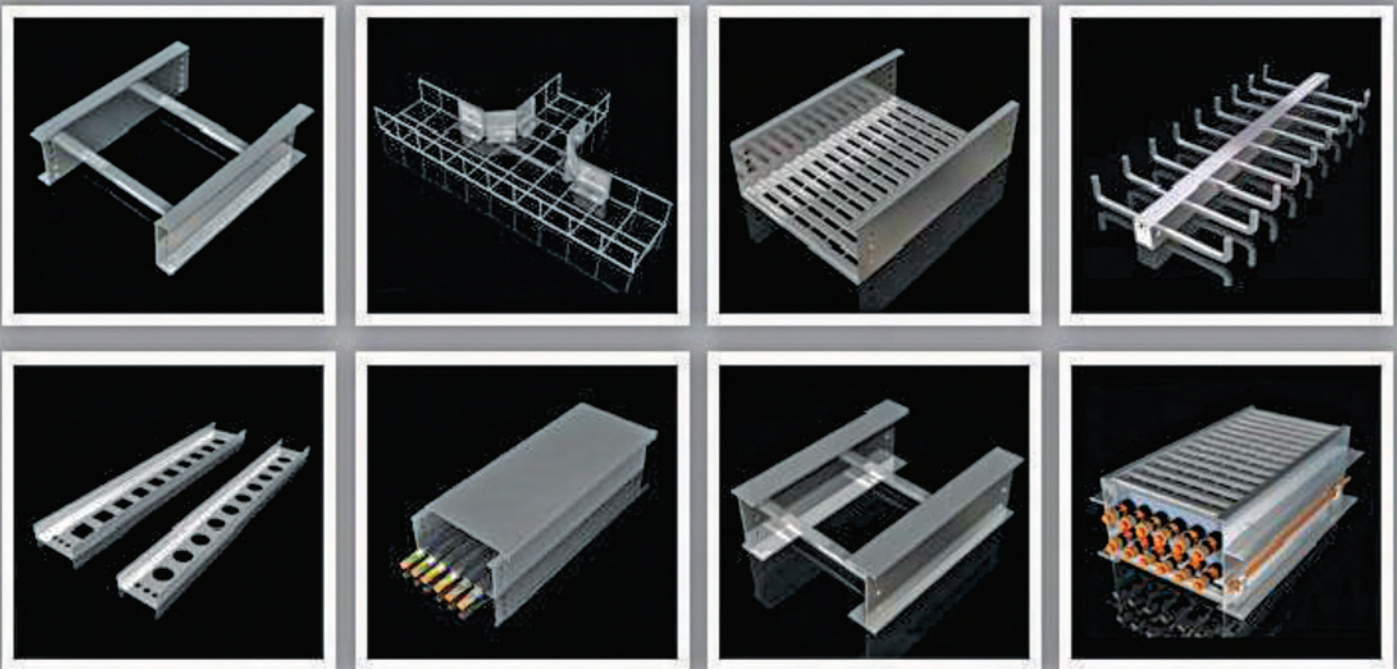


**MP HUSKY**<sup>TM</sup>  
CABLE TRAY & CABLE BUS  
K A B L O   T A V A L A R I

## Cable Tray Systems Engineered to Support Powerful Reputations

MP Husky was founded in 1952 and originally began operations as Husky Products. Over the following 50+ years of leadership and service, MP Husky has gone through several transformations and mergers, including Husky/Burndy and Metal Products, thus leading to what is today MP Husky—***America's leading manufacturer of Cable Tray and Cable Bus Power Distribution Systems.***

Throughout these changes, one thing has remained constant—the “Husky” drive to be the most reliable, highest quality, cost effective and innovative manufacturer of Cable Support Systems and Cable Bus Power Distribution Systems. We have an unsurpassed commitment to customer satisfaction and service, and we are eager to earn your loyalty and trust. As we continue to build and strengthen our partnerships with our customers, we look forward to the next years of service and support.



**Aluminum • Stainless Steel • Galvannealed • Fiberglass**  
**Mill Galvanized • Zinc Plate • Hot Dipped**



**MP HUSKY™**  
CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I

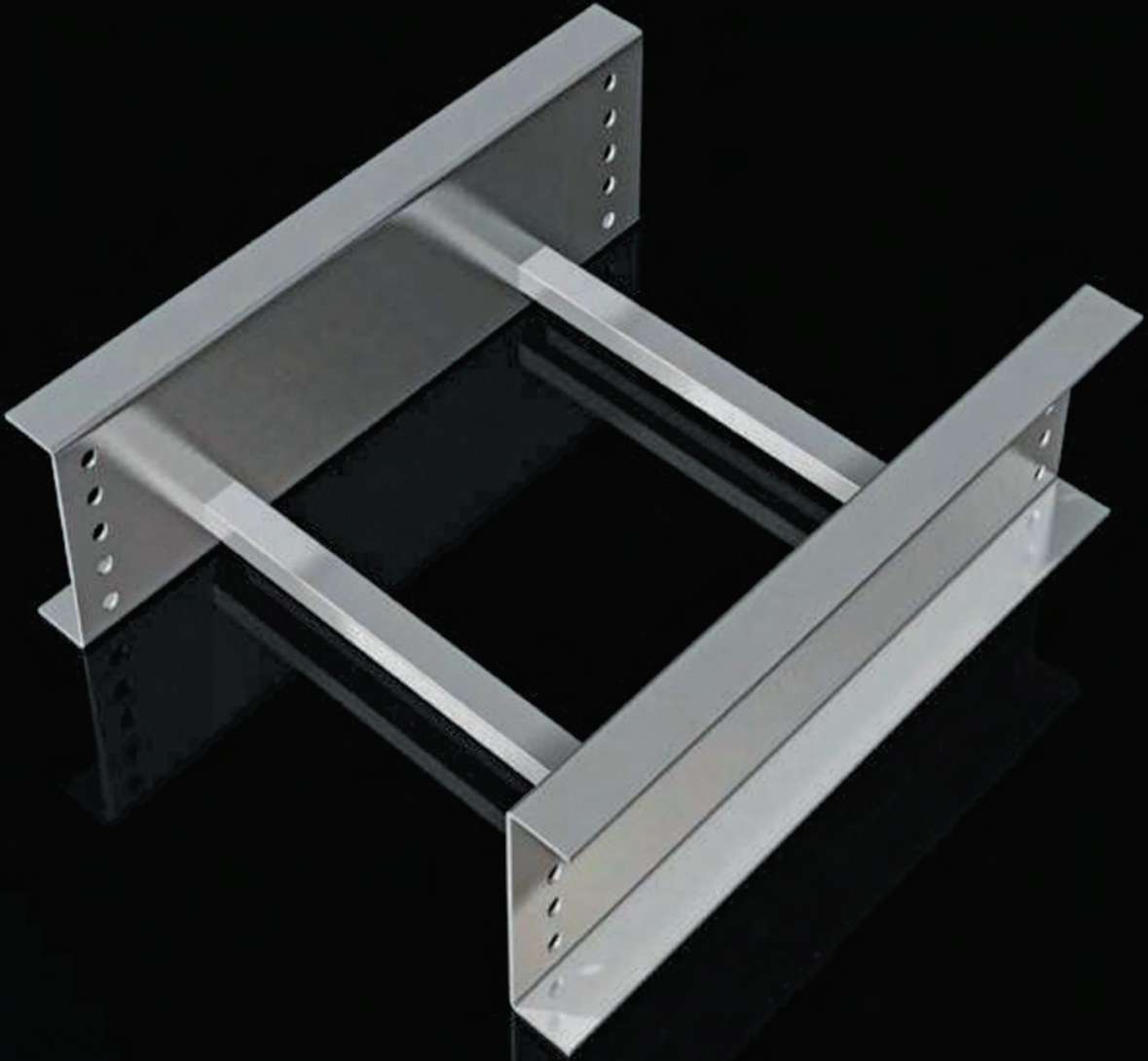
## Husky Ladder Flange-Out

In Steel & Aluminum

## Dışa Bükümlü Kablo Merdiveni

Çelik ve Alüminyum

The upper flange may have an extruded lip, a bent lip, or no lip at all depending on the style.





## Selection Tables • Ürün Seçim Rehberi

NEMA Class	Load (lbs.)/ Span (ft.)	Aluminum - Alüminyum				Steel - Çelik			
		Siderail Height (in.)	Load Depth	Top Flange Width	Prefix	Siderail Height (in.)	Load Depth	Top Flange Width	Prefix
8A	50/8	4.50	3.50	.75	A( )BB	4.00	3.00	1.25	S( )B2
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
8B	75/8	4.50	3.50	.75	A( )BB	4.00	3.00	1.25	S( )B2
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
8C	100/8	4.50	3.50	.75	A( )BB	4.00	3.00	1.25	S( )B2
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
12A	50/12	4.50	3.50	.75	A( )BB	4.00	3.00	1.25	S( )B2
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
12B	75/12	4.50	3.50	.75	A( )BB	4.00	3.00	1.25	S( )B2
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
12C	100/12	4.50	3.50	1.50	A( )CA2	4.50	3.50	1.25	S( )FC
		6.00	5.00	1.00	A( )PB1	6.00	5.00	1.00	S( )P61
		6.00	5.00	1.00	A( )PB1	7.00	6.00	.75	S( )PD7
12C+	100+/12	6.00	5.00	1.25	A( )PC	4.50	3.50	1.25	S( )FC
		6.00	5.00	1.25	A( )PC	6.00	5.00	1.00	S( )P61
		6.00	5.00	1.25	A( )PC	7.00	6.00	0.75	S( )PD74
16A	50/16	4.50	3.50	1.50	A( )CA2	4.50	3.50	1.75	S( )CD
		6.00	5.00	1.75	A( )EA	6.25	5.25	1.75	S( )EB
16B	75/16	4.50	3.50	1.50	A( )CA2	4.50	3.50	1.75	S( )CD
		6.00	5.00	1.75	A( )EA	6.25	5.25	1.75	S( )EB
16C	100/16	6.00	5.00	1.75	A( )E	6.25	5.25	1.75	S( )EB
		7.00	6.00	1.75	A( )E7	7.00	6.00	1.75	S( )EB7
20A	50/20	4.50	3.50	1.50	A( )CA2	4.50	3.50	1.75	S( )CD
		6.00	5.00	1.75	A( )EA	6.25	5.25	1.75	S( )EB
		7.00	6.00	1.75	A( )E7	7.00	6.00	1.75	S( )EB7
20B	75/20	6.00	5.00	1.75	A( )E	6.25	5.25	1.75	S( )EB
		7.00	6.00	1.75	A( )E7	7.00	6.00	1.75	S( )EB7
20C	100/20	6.00	5.00	1.75	A( )E1	6.25	5.25	1.75	S( )ED
		7.00	6.00	1.75	A( )E71	7.00	6.00	1.75	S( )EB7
20C+	100+/20	6.00	5.00	1.75	A( )E1	6.25	5.25	1.75	S( )ED
		7.00	6.00	1.75	A( )E71	7.00	6.00	1.75	S( )EB7
24B+	75/24					6.25	5.25	1.75	S( )ED
						7.00	6.00	1.75	S( )EB7

Husky Flange-Out Ladder has the exclusive Thru-Weld construction—this completely welds rungs to the outside of the rails for optimum structural integrity and reduced side rail rotation.

Husky Dış Bükey merdivenlerin kaynaklaması gövdeyle tümleşik bir yapı oluşturur.





Numbering System • Katalog Kodu Oluşturma

A9BB-24-144				
A	9	BB-	24-	144
Malzeme	Basamak Aralığı	Tava Tipi	Genişlik (Inch)	Uzunluk (Inch)
Materials: A=Aluminum S=HDGAF Steel	Rung Spacing: 6" 9" 12" 18"	Tray Types  Aluminum BB, CA2, EA, PB1, PC, E, E1, E7, E71  Steel B2, FC, CD, EB, EC, ED, P61, PD4, PD7, PD74, EB7,	Widths: 6" 9" 12" 18" 24" 30" 36"	Lengths: BB, PB1, PC, B2, FC, P61, PD4, PD7, PD74 are available in 10' (120") or 12' (144").  All others available in 10' (120"), 12' (144"), 20' (240") & 24' (288")

Other Technical Data • Teknik Bilgiler



**Depth:** 4, 6, and 7"

**Derinlik:** 4, 6, ve 7"

**Fittings:** 12, 24, or 36 inch standard radii

**Aksesuarlar:** 12, 24 ve 36 inch standart yarıçap

**Splice Plates:** Straight sections and fittings are supplied with splice plates and hardware.

**Ek Parçaları:** Merdiven ve aksesuarlar ek parçaları ve hırdavat takımıyla beraber sevk edilirler.

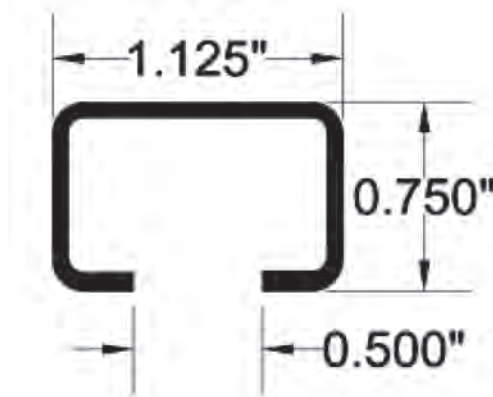
**Safety Factor:** 1.5 NEMA Standard

**Emniyet Katsayısı:** 1.5 NEMA Standard

**Rung Options:** Flange-Out tray can be supplied with optional slotted rungs for ease of securing cables with tie wraps or accessories.

**Basamak Seçenekleri:** Dış bükey merdivenler istenirse daha kolay kablo montajı için delikli basamaklarla da sevk edilebilir.

Rung Dimensions • Basamak Boyutları





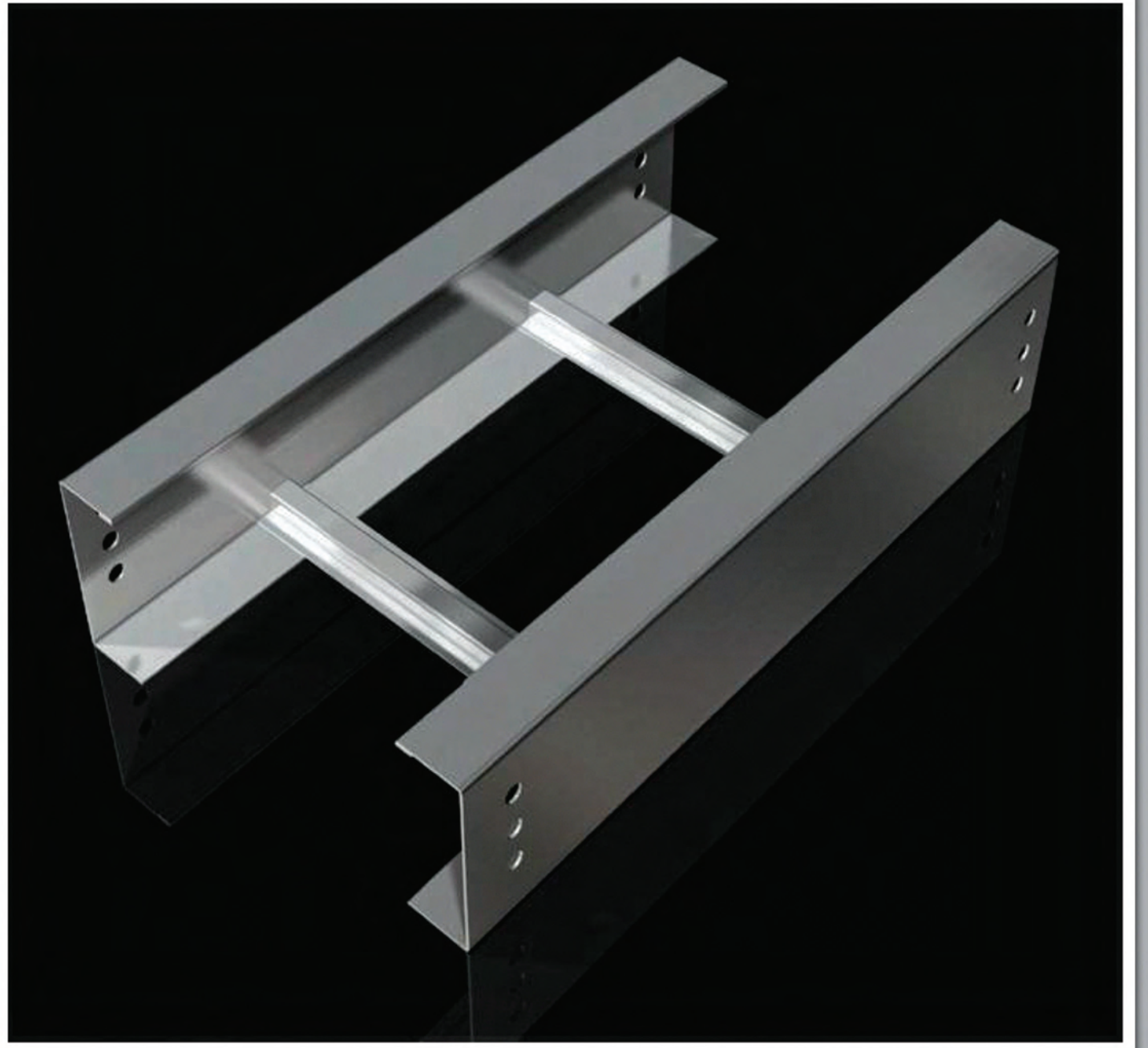
**MP HUSKY**<sup>TM</sup>  
CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I

**Husky Ladder Flange-In**

In Steel & Aluminum

**İçe Bükümlü Kablo Merdiveni**

Çelik ve Alüminyum





Selection Tables • Ürün Seçim Rehberi

NEMA Class	NEMA Load (lbs.) /Span (ft.)	Aluminum - Alüminyum				Steel - Çelik				
		Tray Height	Load Depth	Top Flange Width	Prefix	Tray Height	Load Depth	Top Flange Width	Prefix HDGAF	Prefix Mill-Galv
8A	50/8	4.50	3.50	.75	A( )JA	3.375	2.82	1.25	S( )HA	P( )HA
		6.00	5.00	1.00	A( )MB1	4.00	3.00	1.00	S( )J2	P( )J2
						6.00	5.00		S( )JM61	P( )M61
8B	75/8	4.50	3.50	.75	A( )JA	3.375	2.82	1.25	S( )HA	P( )HA
		6.00	5.00	1.00	A( )MB1	4.00	3.00	1.00	S( )J2	P( )J2
						6.00	5.00		S( )JM61	P( )M61
8C	100/8	4.50	3.50	.75	A( )JA	3.375	2.82	1.25	S( )HA	P( )HA
		6.00	5.00	1.00	A( )MB1	4.00	3.00	1.00	S( )J2	P( )J2
						6.00	5.00		S( )JM61	P( )M61
12A	50/12	4.50	3.50	.75	A( )JA	3.375	2.82	1.25	S( )HA	P( )HA
		6.00	5.00	1.00	A( )MB1	4.00	3.00	1.00	S( )J2	P( )J2
						6.00	5.00		S( )JM61	P( )M61
12B	75/12	4.50	3.50	.75	A( )JB	4.00	3.00	1.25	S( )J2	P( )J2
		6.00	5.00	1.00	A( )MB1	6.00	5.00	1.00	S( )JM61	P( )M61
12C	100/12	4.50	3.50	1.50	A( )YA2	4.50	3.50	1.25	S( )JC	P( )JC
		6.00	5.00	1.00	A( )MB1	6.00	5.00	.75	S( )MD4	P( )MD4
						7.00	6.00	.75	S( )MD7	P( )MD7
12C+	100+/12	4.50	3.50	1.50	A( )YA2	4.50	3.50	1.75	S( )YD	S( )YD
		6.00	5.00	1.25	A( )MC	6.00	5.00	.75	S( )MD4	P( )MD4
						7.00	6.00	.75	S( )MD74	P( )MD74
16A	50/16	4.50	3.50	1.50	A( )YA2	4.50	3.50	1.75	S( )YD	P( )YD
		6.00	5.00	1.75	A( )XA	6.25	5.25	1.75	S( )XB	P( )XB
16B	75/16	4.50	3.50	1.50	A( )YA2	4.50	3.50	1.75	S( )YD	P( )YD
		6.00	5.00	1.75	A( )XA	6.25	5.25	1.75	S( )XB	P( )XB
16C	100/16	6.00	5.00	1.75	A( )XA	6.25	5.25	1.75	S( )XB	P( )XB
						7.00	6.00	1.75	S( )XA7	P( )XA7
20A	50/20	4.50	3.50	1.50	A( )YA2	4.50	3.50	1.75	S( )YD	P( )YD
		6.00	5.00	1.75	A( )XA	6.25	5.25	1.75	S( )XB	P( )XB
						7.00	6.00	1.75	S( )XA7	P( )XA7
20B	75/20	6.00	5.00	1.75	A( )X	6.25	5.25	1.75	S( )XB	P( )XB
		7.00	6.00	1.75	A( )X7	7.00	6.00	1.75	S( )XB7	P( )XB7
20C	100/20	6.00	5.00	1.75	A( )X1					
		7.00	6.00	1.75	A( )X71	6.25	5.25	1.75	S( )XC	P( )XC
		10.00	7.00	1.75	A( )L1	7.00	6.00	1.75	S( )XC7	P( )XC7
20C+	100+/20	6.00	5.00	1.75	A( )X1M					
		8.00	7.00	1.75	A( )L1	6.25	5.25	1.75	S( )XD	P( )XD
		10.00	9.00	1.75	A( )D1	7.00	6.00	1.75	S( )XB7	P( )XB7
24A	50/24					6.25	5.25	1.75	S( )XD	P( )XD
						7.00	6.00	1.75	S( )XB7	P( )XB7
24B	75/24					6.25	5.25	1.75	S( )XD	P( )XD
						7.00	6.00	1.75	S( )XB7	P( )XB7
24C	100/24					7.00	6.00	1.75	S( )XD7	P( )XD7

Since it accommodates the most cable in the least space, Flange-In Husky Ladder is typically used in applications where strength and reliability are important, but space is limited.

Husky içe bükümlü kablo merdivenleri, daha fazla kablo taşıma kapasitesinden dolayı yer darlığı çekilen alanlarda tercih edilir.

## Numbering System • Katalog Kodu Oluşturma

A9JA-24-144				
A	9	JA-	24-	144
Malzeme	Basamak Aralığı	Tava Tipi	Genişlik (Inch)	Uzunluk (Inch)
<b>Materials:</b> A=Aluminum S=HDGAF Steel P=Mill-Galvanized Steel 4=Stainless Steel 304 6=Stainless Steel 316	<b>Rung Spacing:</b> 6" 9" 12"	<b>Tray Types</b> <b>Aluminum</b> JA, J B, MB1, MC, YA2, XA, X, X1, X7, X71, L1, D1 <b>Steel</b> HA, J2, KC, M61, MD4, YD, XA, XB, XC, XD, MD7, MD74, XA7, XB7, XC7, XD7	<b>Widths:</b> 6" 9" 12" 18" 24" 30" 36"	<b>Lengths:</b> JA, J B, MB1, MC, MD4, HA, J2, KC, M61, MD4, MD7, and MD74 available in 10' (120") & 12' (144") only All others available in 10' (120"), 12' (144"), 20' (240") & 24' (288")

## Other Technical Data • Teknik Bilgiler



**Depth:** 3-3/8, 4, 6, 7, 8, and 10 inches nominal

**Derinlik:** 3-3/8, 4, 6, 7, 8, ve 10 inch nominal

**Fittings:** 12, 24, or 36 inch standard radii

**Aksesuarlar:** 12, 24, 36 inch standart yarıçap

**Splice Plates:** Straight sections and fittings are supplied with splice plates and hardware.

**Ek parçaları:** Merdiven ve aksesuarlar ek parçaları ve hırdavat takımıyla beraber sevk edilirler.

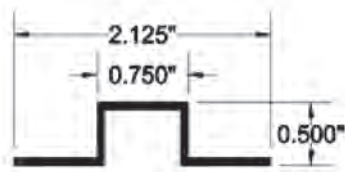
**Safety Factor:** 1.5 NEMA Standard

**Emniyet Katsayısı:** 1.5 NEMA Standard

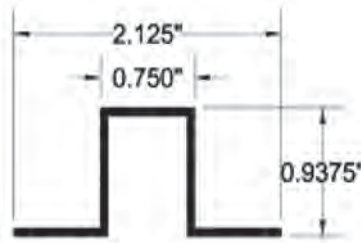
**Rung Options:** Flange-In tray can be supplied with optional slotted or strut type rungs for ease of securing cables with tie wraps, strut clamps or accessories.

**Basamak Seçenekleri:** İç bükey merdivenler istenirse daha kolay kablo montajı için delikli basamaklarla da sevk edilebilir.

## Rung Dimensions • Basamak Boyutları



6"-24" Wide Aluminum Ladder  
 6"-24" Wide Steel Ladder  
 30"-36" Wide Steel "HA" Style Ladder



30"-36" Wide Steel & Aluminum Ladder  
 (Optional Steel Rung)

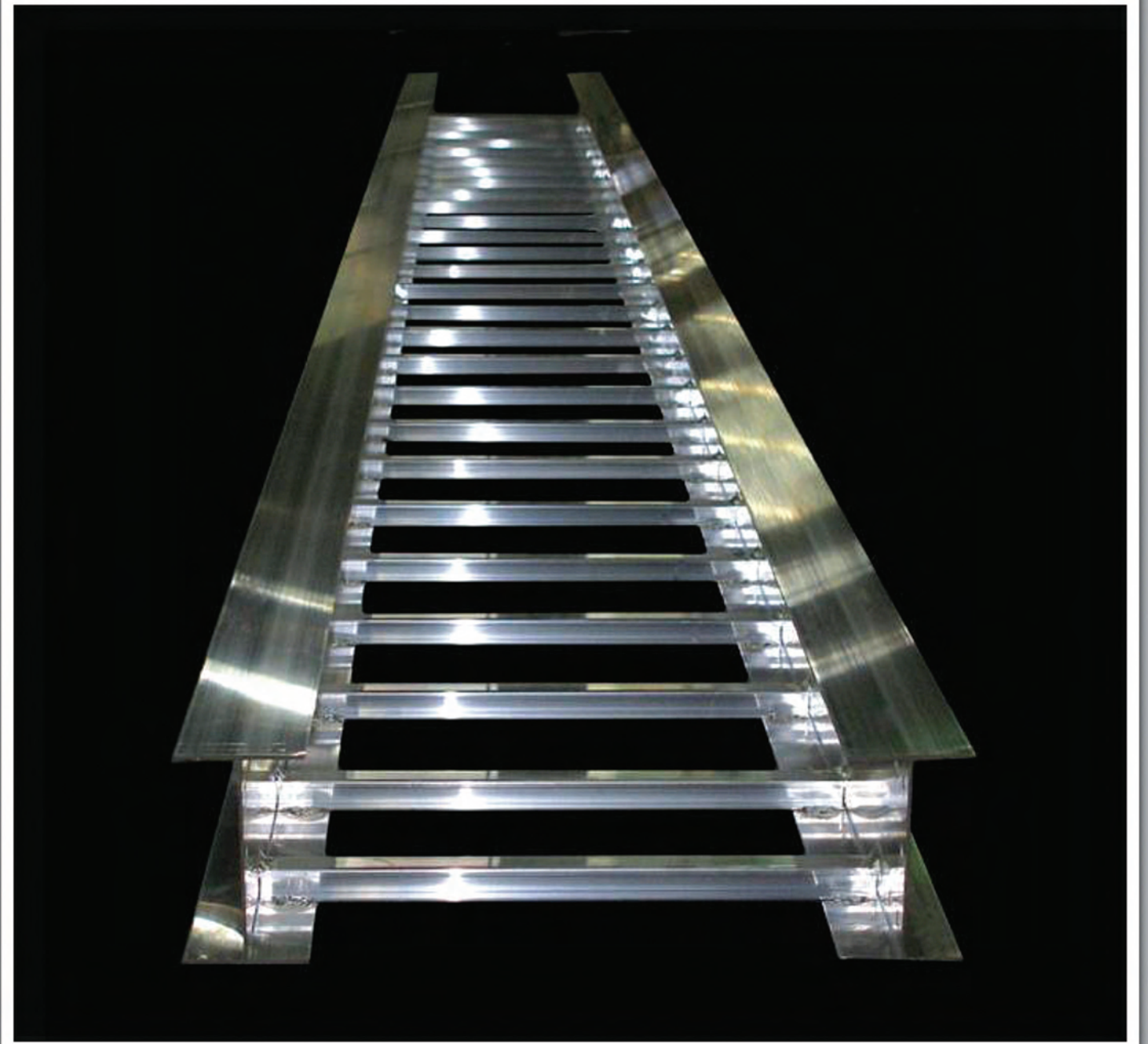




**MP HUSKY**™  
CABLE TRAY & CABLE BUS  
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**Husky I-Beam**  
Aluminum

**I-Profil Merdiven**  
Aluminyum

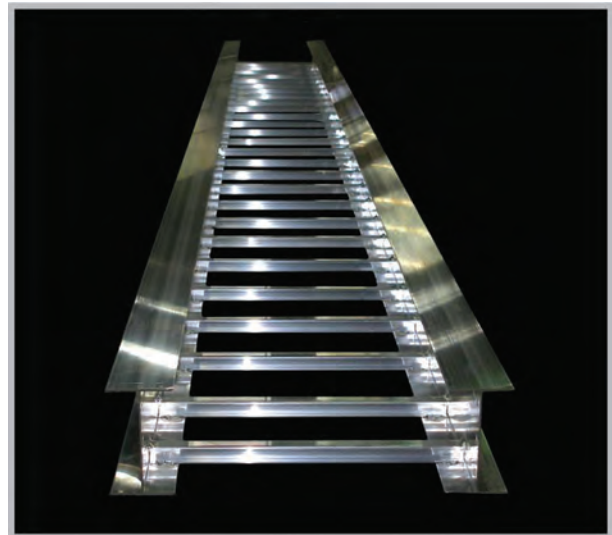


## Selection Tables • Ürün Seçim Rehberi

Aluminum I Beam Tray - Alüminyum I-Profil Kablo Merdiveni					
NEMA Class	NEMA Load (lbs.)/Span (ft.)	Tray Height (in)	Load Depth (in)	Top Flange Width (in)	Prefix
12A	50/12	4-½ 6	3-½ 5	1-¼ 2	A( )IJA A( )IMB
12B	75/12	4-½ 6	3-½ 5	1-¼ 2	A( )IJB A( )IMB
12C	100/12	4-½ 6	3-½ 5	1-¼ 2	A( )IJC A( )IMC
12C+	100+/12	6	5	2	A( )IMD
20A	50/20	4-½ 4-½ 6	3-½ 3-½ 5	2 2 2	A( )IYA A( )IYB A( )IXA
20B	75/20	4-½ 6	3-½ 5	2 2	A( )IYB A( )IXB
20C	100/20	4-½ 6 7	3-½ 5 6	2 2 2	A( )IYC A( )IXC A( )IXD7
20C+	100+/20	6 7	5 6	2 2	A( )IXD A( )IXD7
24B+	75+/24	7	6	2	AIXD7
24C+	100+/24	6	5	3-½	A( )I6
30C+	100+/30	8	7	3	A( )I8

MP Husky now offers I-Beam style trays for customers that prefer the I-Beam style tray design or for those that want to add to existing I-Beam tray installations.

MP Husky yeni olarak portföyüne I-Profil kablo merdivenini de ekledi.





Numbering System • Katalog Kodu Oluşturma

A9IMC-24-144				
A	9	IMC-	24-	144
Malzeme	Basamak Aralığı	Tava Tipi	Genişlik	Uzunluk
Materials: A=Aluminum	Rung Spacing: 6" 9" 12" 18"	Tray Types IJA, IJB, IJC, IYA, IYB, IYC, IMB, IMC, IMD, IXA, IXB, IXC, IXD, I6, IXD7, I8	Widths: 6" 9" 12" 18" 24" 30" 36"	Lengths: IJA, IJB, IJC, IMB, IMC and IMD available in 10' (120") & 12' (144")  Only All others available in 10' (120"), 12' (144"), 20' (240") & 24' (288") I8 is also available in 30' (360")

Other Technical Data • Teknik Bilgiler



**Depth:** ½, 6, 7 & 8 inches

**Derinlik:** ½, 6, 7 & 8 inch

**Fitting:** 12, 24 & 36 inch radius

**Aksesuarlar:** 12, 24 & 36 inch radius

**Splice Plates:** Bolted splice connectors

**Ek Parçaları:** Civatalı ek parçaları kullanılır

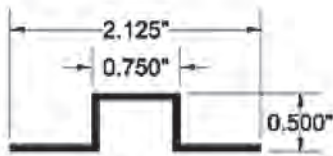
**Safety Factor:** 1.5 NEMA Standard

**Emniyet Katsayısı:** 1.5 NEMA Standard

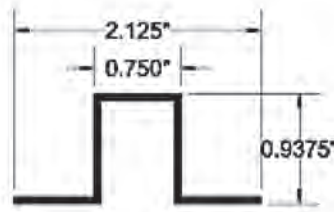
**Rung Options:** I-Beam tray can be supplied with optional slotted or strut type rungs for ease of securing cables with tie wraps, strut clamps or accessories.

**Basamak Seçenekleri:** Profil merdivenler istenirse daha kolay kablo montajı için delikli basamaklarla da sevk edilebilir.

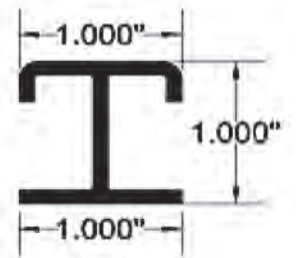
Rung Dimensions • Basamak Boyutları



6" - 24" Wide Aluminium Ladder  
Except I6 & I8



30" - 36" Wide Aluminium Ladder  
Except I6 & I8



Rung used on  
A ( ) I6 & A ( ) I8



# MP HUSKY™

CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I

## Husky Way

In Aluminum, Mill-Galvanized  
Steel, Galvannealed Steel,  
304 and 316 Stainless Steel

## Husky Kablo Kanalı

Alüminyum, Pregalvaniz,  
Galvaniz Tavlı ve 304/316  
Paslanmaz Çelik





## Selection Tables • Ürün Seçim Rehberi

Aluminum - Alüminyum					
Load	Support Span	Height (in.)	Depth (in.)	Width (in.)	Prefix
100lbs/ft	10ft	3.38	3.31	6, 9, 12, 18, 24, 30, 36	ASH6
100lbs/ft	10ft	4	3.94	6, 9, 12, 18, 24, 30, 36	ASJ6
100lbs/ft	10ft	6	5.94	6, 9, 12, 18, 24, 30, 36	ASM6

Galvannealed - Galvaniz Tavlı Çelik					
Load	Support Span	Siderail Height (in.)	Load Depth (in.)	Tray Width (in.)	Prefix
100lbs/ft	10ft	3.38	3.35	6, 9, 12, 18, 24, 30, 36	NSH0
100lbs/ft	10ft	4	3.96	6, 9, 12, 18, 24, 30, 36	NSJ0
100lbs/ft	10ft	6	5.96	6, 9, 12, 18, 24, 30, 36	NSM0

Mill-Galvanized Steel - Pregalvaniz Çelik					
Load	Support Span	Height (in.)	Depth (in.)	Width (in.)	Prefix
100lbs/ft	10ft	3.38	3.35	6, 9, 12, 18, 24, 30, 36	PSH0
100lbs/ft	10ft	4	3.96	6, 9, 12, 18, 24, 30, 36	PSJ0
100lbs/ft	10ft	6	5.96	6, 9, 12, 18, 24, 30, 36	PSM0

304 Stainless Steel - 304 Kalite Paslanmaz Çelik					
Load	Support Span	Siderail Height (in.)	Load Depth (in.)	Tray Width (in.)	Prefix
100lbs/ft	10ft	3.38	3.35	6, 9, 12, 18, 24, 30, 36	4SH0
100lbs/ft	10ft	4	3.96	6, 9, 12, 18, 24, 30, 36	4SJ0
100lbs/ft	10ft	6	5.96	6, 9, 12, 18, 24, 30, 36	4SM0

316 Stainless Steel - 316 Kalite Paslanmaz Çelik					
Load	Support Span	Siderail Height (in.)	Load Depth (in.)	Tray Width (in.)	Prefix
100lbs/ft	10ft	3.38	3.35	6, 9, 12, 18, 24, 30, 36	6SH0
100lbs/ft	10ft	4	3.96	6, 9, 12, 18, 24, 30, 36	6SJ0
100lbs/ft	10ft	6	5.96	6, 9, 12, 18, 24, 30, 36	6SM0

## Numbering System • Katalog Kodu Oluřturma

ASH6-12-120-BF					
A	S	H6-	12-	144	-BF
Malzeme	Taban Tipi	Kenar Ykseklięi	Geniřlik Inch	Uzunluk Inch	Brake Form
Materials: A=Aluminum N=Galvannealed P=Mill-Galvanized 4=Stainless Steel 304 6=Stainless Steel 316	Bottom Type:: S=Solid Bottom	Side Wall Height: H0= 3-3/8" steel H6=3-3/8" alum J0=4" steel J6=4" alum M0=6" steel M6=6" alum	Widths: 6" 9" 12" 18" 24" 30" 36"	Lengths: 10' (120")	Tray Type: Brake Form Pan

## Other Technical Data • Teknik Bilgiler



**Depth:** 3-3/8, 4, 6 inch

**Derinlik:** 3-3/8, 4, 6 inch

**Fittings:** 12, 24 or 36 inch standard radii

**Aksesuarlar:** 12, 24 ya da 36 inch standart yarıçap

**Splice Plates:** Straight sections and fittings are supplied with splice plates and hardware.

**Ek Parçaları:** Merdiven ve aksesuarlar ek parçaları ve hırdavat takımıyla beraber sevk edilirler.

**Safety Factor:** Husky Way is manufactured and tested in accordance with NEMA VE-1. The tables on the following pages have a 1.5 safety factor.

**Emniyet Katsayısı:** Husky Kablo Kanalı NEMA VE-1'e uygun olarak retilmiř ve test edilmiřtir. Bu sayfalardaki tabloların hepsi 1.5 emniyet katsayısına gore hazırlanmıřtır.

**NOTE:** Cover sold separately.

**NOT:** Kapaklar ayrı sipariř edilirler.



**MP HUSKY™**  
CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I

**Fittings**  
**Aksesuarlar**





## Numbering System • Katalog Kodu Oluşturma

Example Fitting for S6YD, S9YD, S12YD

SLYD-24H90-24				
Prefix - Örnek	Basic Part Number - Temel Katalog Numarası			
<b>SLYD-</b>	<b>24</b>	<b>H</b>	<b>90-</b>	<b>24</b>
Tray Fitting Prefix Aksesuar Tipi, aşağıdaki tablo ve tava tipine göre seçilir ve ilk hece oluşturulur	Tray Width / Tava Genişliği 6" 9" 12" 18" 24" 30" 36"	Bend / Dönüş H=Horizontal VI=Vertical Inside VO=Vertical Outside T=Tee VT=Vertical Tee VTU=Upside-Down Vert. Tee VS=Vertical Support 90° X=Cross R=Straight Reducer RL=Left Hand Reducer RR=Right Hand Reducer	Degree of Bend / Dönüş Açısı 30° 45° 60° 90°	Fitting Radius / Yarıçap 12" 24" 36"

### To Determine Fitting Catalog Number (Prefix + Basic Part Number):

1. Select prefix of type of Cable Tray required for your application from Catalog pages below
2. Use selected Cable Tray prefix in the Fitting Prefix Selection Tables below to select the corresponding fitting prefix.
3. Based on the Tray Width, Bend Type, Degree of Bend and the Fitting Radius form the Basic Part Number that correspond to the required fittings.
4. Add fitting prefix to basic part numbers to complete product catalog numbers (example above).

### Aksesuar Katalog Numarasını Belirlemek İçin (Önek + Temel Katalog Numarası):

1. Kablo tavaşı için uygun öneki aşağıdaki tablolardan seçin.
2. Seçilen öneke uygun olarak, aynı tablodan aksesuar için öneki seçin.
3. Tava genişliği, dönüş tipi, dönüşün açısının derecesi ve yarıçapa göre, temel katalog numarasını oluşturun.
4. Önekin ardına temel katalog numarasını ekleyerek, katalog numarasını belirleyin.

ALUMINUM Fitting Prefix Selection Table								
Husky Ladder - Flange-In			Husky Ladder - Flange-Out			Husky I-Beam Ladder		
Rail Height	Straight Tray	Fitting Prefix	Rail Height	Straight Tray	Fitting Prefix	Rail Height	Straight Tray	Fitting Prefix
1/2"	A6JA, A9JA, A12JA	ALJA				4-1/2"A	A6IJA, A9IJA, A12IJA	ALIJA
4-1/2"	A6JB, A9JB, A12JB	ALJB	4-1/2"	A9BB, A12BB, A18BB	ALBB	4-1/2"	A6IJB, A9IJB, A12IJB	ALIJB
4-1/2"	A6YA2, A9YA2, A12YA2	ALYA2	4-1/2"	A9CA2, A12CA2, A18CA2	ALCA2	4-1/2"	A6IJC, A9IJC, A12IJC	ALIJC
6"	A6MB1, A9MB1, A12MB1	ALMB1	6"	A6PB1, A9PB1, A12PB1	ALPB1	4-1/2"	A6IYA, A9IYA, A12IYA	ALIYA
6"	A6MC, A9MC, A12MC	ALMC	6"	A9PC, A12PC, A18PC	ALPC	4-1/2"	A6IYB, A9IYB, A12IYB	ALIYB
6"	A6XA, A9XA, A12XA	ALX	6"	A9EA, A12EA, A18EA	ALE	4-1/2"	A6IYC, A9IYC, A12IYC	ALTYC
6"	A6X, A9X, A12X	ALX	6"	A9E, A12E, A18E	ALE	6"	A6IMB, A9IMB, A12IMB	ALIMB
6"	A6X1, A9X1, A12X1	ALX	6"	A9E1, A12E1, A18E1	ALE	6"	A6IMC, A9IMC, A12IMC	ALIMC
6"	A9X1M, A12X1M, A18X1M	ALX1M	6"	A9E1M, A12E1M, A18E1M	ALE1M	6"	A6IMD, A9IMD, A12IMD	ALIMD
7"	A6X7, A9X7, A12X7	ALX7	7"	A9E7, A12E7, A18E7	ALE7	6"	A6IXA, A9IXA, A12IXA	ALIXA
7"	A6X71, A9X71, A12X71	ALX7	7"	A9E71, A12E71, A18E71	ALE7	6"	A6IXB, A9IXB, A12IXB	ALIXB
8"	A6L1, A9L1, A12L1	ALL1				6"	A6IXC, A9IXC, A12IXC	ALIXC
10"	A6D1, A9D1, A12D1	ALD1				6"	A6IXD, A9IXD, A12IXD	ALIXD
Aluminum Husky Way						6"	A9I6, A12I6, A18I6	ALI6
3-3/8"	ASH6	ASH6				7"	A6IXD7, A9IXD7, A12IXD7	ALIXD7
4"	ASJ6	ASJ6				8"	A9I8, A12I8, A18I8	ALI8
6"	ASM6	ASM6						

ALUMINUM Fitting Prefix Selection Table							
Aluminum Husky Trough				Aluminum Husky I-Beam Trough			
Rail Height	Straight Tray	Ventilated Fitting Prefix	Solid Fitting Prefix	Rail Height	Straight Tray	Ventilated Fitting Prefix	Solid Fitting Prefix
4-1/2"	AJA/ASJA	AJA	ASJA	4-1/2"	AIJA/ASIJA	AIJA	ASIJA
4-1/2"	A4JA	A4JA		4-1/2"	A4IJA	A4IJA	
4-1/2"	AJB/ASJB	AJB	ASJB	4-1/2"	AIBJ/ASIBJ	AIBJ	ASIBJ
4-1/2"	A4JB	A4JB		4-1/2"	A4IBJ	A4IJA	
4-1/2"	AYA2/ASYA2	AYA2	ASYA2	4-1/2"	AIJC/ASIJC	AIJC	ASIJC
4-1/2"	A4YA2	A4YA2		4-1/2"	A4IJC	A4IJC	
6"	AMB1/ASMB1	AMB1	ASMB1	4-1/2"	AIYA/ASIYA	AIYA	ASIYA
6"	A4MB1	A4MB1		4-1/2"	A4IYA	A4IYA	
6"	AMC/ASMC	AMC	ASMC	4-1/2"	AIYB/ASIYB	AIYB	ASIYB
6"	A4MC	A4MC		4-1/2"	A4IYB	A4IYB	
6"	AXA/ASXA	AX	ASX	4-1/2"	AIYC	AIYC	ASIYC
6"	A4XA	A4X		4-1/2"	A4IYC	A4IYC	
6"	AX/ASX	AX	ASX	6"	AIMB/ASIMB	AIMB	ASIMB
6"	A4X	A4X		6"	A4IMB	A4IMB	
6"	AX1/ASX1	AX	ASX	6"	AIMC/ASIMC	AIMC	ASIMC
6"	A4X1	A4X		6"	A4IMC	A4IMC	
6"	AX1 M, ASX1 M	AX1M	ASX1M	6"	AIMD/ASIMB	AIMD	ASIMD
6"	A4X1M	A4X1M		6"	A4IMD	A4IMD	
7"	AX7/ASX7	AX7	ASX7	6"	AIXA/ASIXA	AIXA	ASIXA
7"	A4X7	A4X7		6"	A4IXA	A4IXA	
7"	AX71/ASX71	AX7	ASX7	6"	AIXB/ASIXB	AIXB	ASIXB
7"	A4X71	A4X71		6"	A4IXB	A4IXB	
8"	AL1/ASL1	AL1	ASL1	6"	AIXC/ASIXC	AIXC	ASIXC
8"	A4L1	A4L1		6"	A4IXC	A4IXC	
10"	AD1/ASD1	AD1	ASD1	6"	AIXD/ASIXD	AIXD	ASIXD
10"	A4D1	A4D1		6"	A4IXD	A4IXD	
				6"	AI6, ASI6	AI6	ASI6
				6"	A4I6	A4I6	
				7"	AIXD7/ASIXD7	AIXD7	ASIXD7
				7"	A4IXD7	A4IXD7	
				8"	AI8/ASI8	AI8	ASI8
				8"	A4I8	A4I8	

**Sample Cross Catalog No. (Prefix + Basic)**

ALBB-	24X-12
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Husky Ladder—Flange-Out 24"W x 12"R Horizontal Cross

Please contact our office for accessories, splices and connectors.

Ek parçaları ve hırdavatlar için, bizimle bağlantıya geçebilirsiniz.

**STEEL Fitting Prefix Selection Table**

Husky Trough				Fitting Prefix Selection Table		Husky Ladder - Flange-Out	
Rail Height	Straight Tray	Ventilated Fitting Prefix	Solid Fitting Prefix	Straight Tray	Fitting Prefix	Straight Tray	Fitting Prefix
3-3/8"	SHA/SSHA	SHA	SSHA	S6HA, S9HA, S12HA	SLHA	—	—
3-3/8"	S4HA	S4HA					
3-3/8"	PHA/PSHA	PHA	PSHA	P6HA, P9HA, P12HA	PLHA	—	—
3-3/8"	P4HA	P4HA					
4"	SJ2/SSJ2	SJ2	SSJ2	S6J2, S9J2, S12J2	SLJ2	S9B2, S12B2, S18B2	SLB2
4"	S4J2	S4J2					
4"	PJ2/PSJ2	PJ2	PSJ2	P6J2, P9J2, P12J2	PLJ2	—	—
4"	P4J2	P4J2					
4-1/2"	SKC/SSKC	SKC	SSKC	S6KC, S9KC, S12KC	SLKC	S9FC, S12FC, S18FC	SLFC
4-1/2"	S4KC	S4KC					
4-1/2"	PKC/PSKC	PKC	PSKC	P6KC, P9KC, P12KC	PLKC	—	—
4-1/2"	P4KC	P4KC					
4-1/2"	SYD/SSYD	SYD	SSYD	S6YD, S9YD, S12YD	SLYD	S9CD, S12CD, S18CD	SLCD
4-1/2"	S4YD	S4YD					
4-1/2"	PYD/PSYD	PYD	PSYD	P6YD, P9YD, P12YD	PLYD	—	—
4-1/2"	P4YD	P4YD					
6"	SM61/SSM61	SM61	SSM61	S6M61, S9M61, S12M61	SLM61	S9P61, S12P61, S18P61	SLP61
6"	S4M61	S4M61					
6"	PM61/PSM	PM61	PSM61	P6M61, P9M61, P12M61	PLM61	—	—
6"	P4M61	P4M61					
6"	SMD4/SSMD4	SMD4	SSMD4	S6MD4, S9MD4, S12MD4	SLMD4	S9PD4, S12PD4, S18PD4	SLPD4
6"	S4MD4	S4MD4					
6"	PMD4/PSMD4	PMD4	PSMD4	P6MD4, P9MD4, P12MD4	PLMD4	—	—
6"	P4MD4	P4MD4					
6-1/4"	SXB/SSXB	SXB	SSXB	S6XB, S9XB, S12XB	SLXB	S9EB, S12EB, S18EB	SLEB
6-1/4"	S4XB	S4XB					
6-1/4"	PXB/PSXB	PXB	PSXB	P6XB, P9XB, P12XB	PLXB	—	—
6-1/4"	P4XB	P4XB					
6-1/4"	SXC/SSXC	SXC	SSXC	S6XC, S9XC, S12XC	SLXC	S9EC, S12EC, S18EC	SLEC
6-1/4"	S4XC	S4XC					
6-1/4"	PXC/PSXC	PXC	PSXC	P6XC, P9XC, P12XC	PLXC	—	—
6-1/4"	P4XC	P4XC					
6-1/4"	SXD/SSXD	SXD	SSXD	S6XD, S9XD, S12XD	SLXD	S9ED, S12ED, S18ED	SLED
6-1/4"	S4XD	S4XD					
6-1/4"	PXD/PSXD	PXD	PSXD	P6XD, P9XD, P12XD	PLXD	—	—
6-1/4"	P4XD	P4XD					

Please contact our office for accessories, splices and connectors.

Ek parçaları ve hırdavatlar için, bizimle bağlantıya geçebilirsiniz.



STEEL Fitting Prefix Selection Table							
Husky Trough				Fitting Prefix Selection Table		Husky Ladder - Flange-Out	
Rail Height	Straight Tray	Ventilated Fitting Prefix	Solid Fitting Prefix	Straight Tray	Fitting Prefix	Straight Tray	Fitting Prefix
7"	SMD7/SSMD7	SMD7	SSMD7	S6MD7, S9MD7, S12MD7	SLMD7	S9PD7, S12PD7, S18PD7	SLPD7
7"	S4MD7	S4MD7					
7"	PMD7/PSMD7	PMD7	PSMD7	P6MD7, P9MD7, P12MD7	PLMD7	—	—
7"	P4MD7	P4MD7					
7"	SMD74/SSMD74	SMD74	SSMD74	S6MD74, S9MD74, S12MD74	SLMD74	S9PD74, S12PD74, S18PD74	SLPD74
7"	S4MD74	S4MD74					
7"	PMD74/PSMD74	PMD74	PSMD74	P6MD74, P9MD74, P12MD74	PLMD74		
7"	P4MD74	P4MD74					
7"	SXA7/SSXA7	SXA7	SSXA7	S6XA7, S9XA7, S12XA7	SLXA7		
7"	S4XA7	S4XA7					
7"	PXA7/PSXA7	PXA7	PSXA7	P6XA7, P9XA7, P12XA7	PLXA7		
7"	P4XA7	P4XA7					
7"	SXB7/SSXB7	SXB7	SSXB7	S6XB7, S9XB7, S12XB7	SLXB7	S9EB7, S12EB7, S18EB7	SLEB7
7"	S4XB7	S4XB7					
7"	PXB7/PSXB7	PXB7	PSXB7	P6XB7, P9XB7, P12XB7	PLXB7		
7"	P4XB7	P4XB7					
7"	SXC7/SSXC7	SXC7	SSXC7	S6XC7, S9XC7, S12XC7	SLXC7	S9EC7, S12EC7, S18EC7	SLEC7
7"	S4XC7	S4XC7					
7"	PXC7/PSXC7	PXC7	PSXC7	P6XC7, P9XC7, P12XC7	PLXC7		
7"	P4XC7	P4XC7					
7"	SXD7/SSXD7	SXD7	SSXD7	S6XD7, S9XD7, S12XD7	SLXD7		
7"	S4XD7	S4XD7					
7"	PXD7/PSXD7	PXD7	PSXD7	P6XD7, P9XD7, P12XD7	PLXD7		
7"	P4XD7	P4XD7					

Steel Husky Way		
3-3/8"	PSHO	PSHO
4"	PSJO	PSJO
6"	PSMO	PSMO
3-3/8"	NSHO	NSHO
4"	NSJO	NSJO
6"	NSMO	NSMO
3-3/8"	4SHO	4SHO
4"	4SJO	4SJO

Steel EMI Tray	
EM4	EM4
EM6	EM6

**Sample Reducing Cross Catalog No.  
(Prefix + Basic)**

ALBB-	24X-12-12
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Husky Ladder—Flange-Out 24"W x 12"R Horizontal Cross

Please contact our office for accessories, splices and connectors.

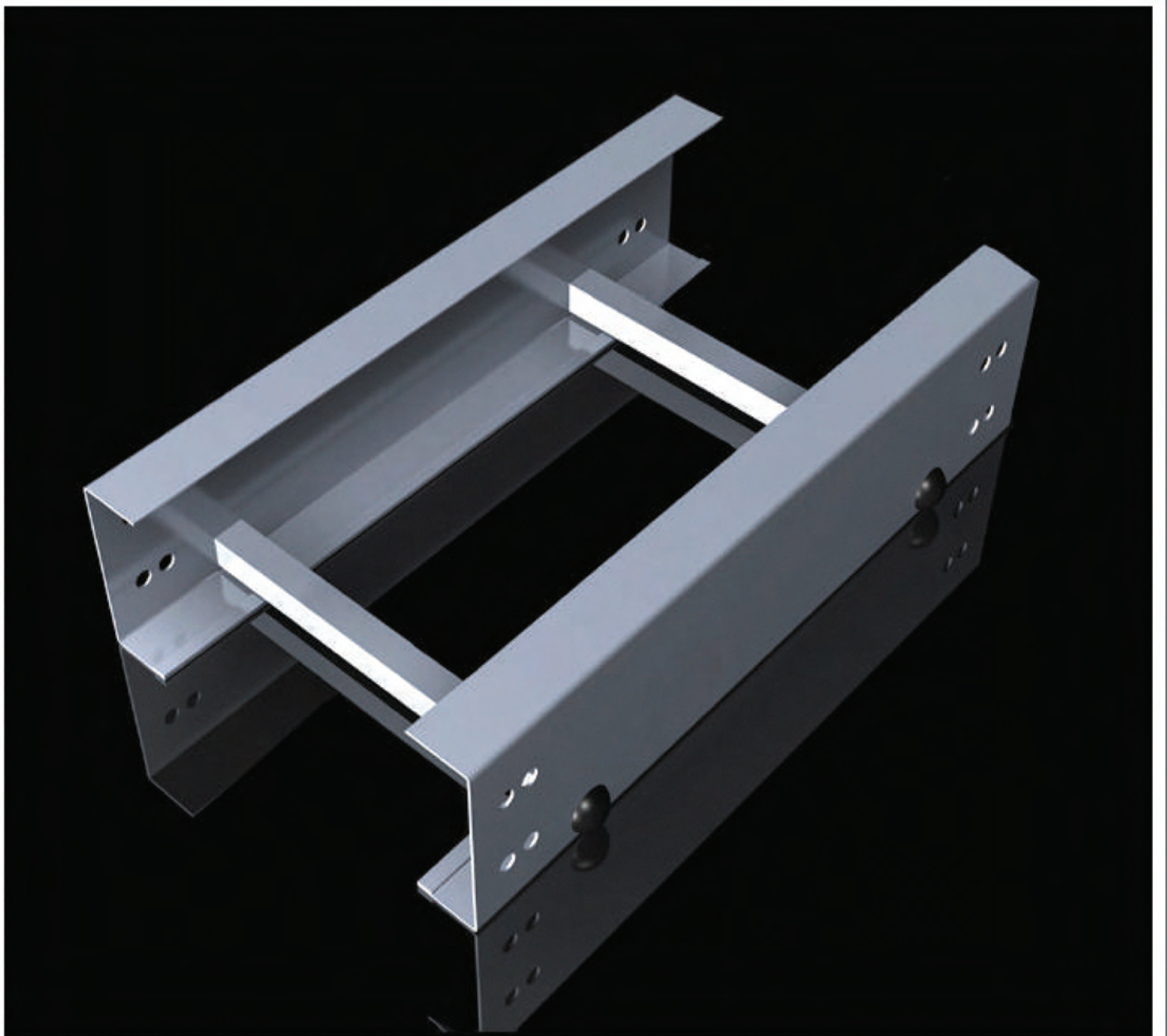
Ek parçaları ve hırdavatlar için, bizimle bağlantıya geçebilirsiniz.



**MP HUSKY**™  
CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I

**Husky Fiberglass  
Cable Tray**

**Husky Fiberglass  
Kablo Merdiveni**



## Numbering System • Katalog Kodu Oluşturma

6BP-09-24-120				
6B Series	P- Material	09- Rung Spacing	24- Width	240 Length
Tava Modeli 6" (6B, 6C, H6C) Based on NEMA classification—see next page for details  Bir sonraki sayfadaki tablolarla göre	Malzeme P=Polyester Resin V=Vinylester Resin	Basamak Aralığı 06" 09" 12" 18"	Genişlik 06" 09" 12" 18" 24" 30" 36"	Uzunluk 120 (10ft.) 240 (20ft.)

### How to Order Husky Fiberglass Cable Tray:

1. Select the correct MP Husky Series Cable Tray using the Load Data for straight sections shown in the appropriate tabbed section for 6", 4" and 3" Cable Tray. **(Example: 6BP-09- 24-240 would be for NEMA 20B tray).**
2. Select the resin required. Refer to the Corrosion Guide on pages 215-218 of the Technical Data Section for the effect of environmental conditions on the desired material. This section also contains the temperature range for our tray.
3. The tray prefix is completed by inserting the rung spacing.
4. The fourth box contains the straight section width in inches.
5. The fifth box contains the straight section length in inc

1. Kablo ağırlığı tablolarından uygun tava tipini (6", 4" ya da 3") seçin
2. Ortama göre kullanılacak malzemeyi belirleyin (polyester ya da Vinylester)
3. Daha sonra basamak aralığını da ekleyerek, temel katalog numarasını tamamlayın.
4. Dördüncü kutu, tava genişliği,
5. Beşinci kutu da tava boyu içindir.

### Please note:

One pair of splice plates with hardware is included. Fittings are available in molded or mitered design.

### Not:

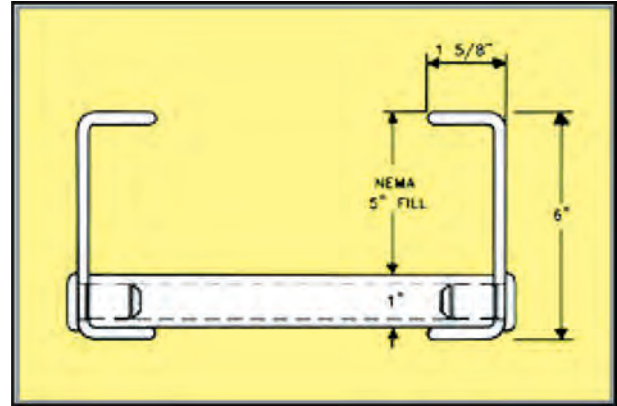
Her boy için hırdavat dahil bir çift ek parçası sevk edilir.





## Series 6

To obtain deflection at any span length for lighter loads than listed, multiply the load by the K factor. When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%.



Husky Series 6B / NEMA 20B				Safety Factor 1.5	
Span (Ft.)	12	14	16	18	20
Design Load Lbs./Ft.	254	186	143	113	91
Deflection	1.6	2.2	2.8	3.6	4.4
K Factor	0.006	0.012	0.020	0.032	0.048

\*Tested per NEMA FG-1, 12" rung spacing

Husky Series 6C / NEMA 20C				Safety Factor 1.5	
Span (Ft.)	12	14	16	18	20
Design Load Lbs./Ft.	356	262	200	158	128
Deflection	1.6	2.2	2.9	3.7	4.6
K Factor	0.004	0.008	0.015	0.023	0.136

\*Tested per NEMA FG-1, 12" rung spacing

Husky Series 6C / NEMA 20C				Safety Factor 1.5	
Span (Ft.)	12	14	16	18	20
Design Load Lbs./Ft.	386	283	217	171	139
Deflection	1.8	2.4	3.2	4.0	5.0
K Factor	0.005	0.008	0.015	0.023	0.036

Husky Series H6C/ NEMA 20C

Husky Series 6C / NEMA 20C				Safety Factor 1.5	
Span (Ft.)	12	14	16	18	20
Design Load Lbs./Ft.	289	212	163	129	104
Deflection	1.3	1.8	2.4	3.0	3.7
K Factor	0.004	0.008	0.015	0.023	0.036

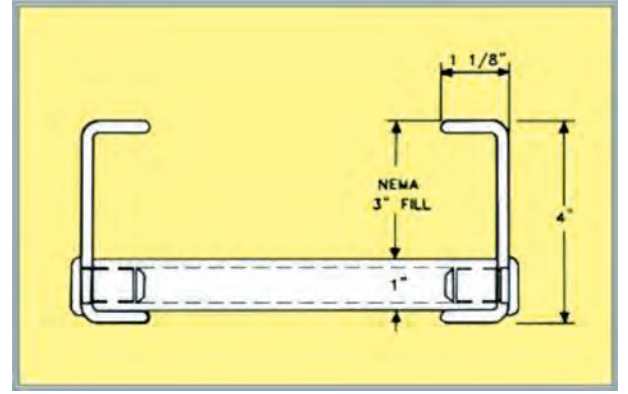
Husky Series H6C/ NEMA 20C

## Series 4

Numbering System • Katalog Kodu Oluşturma

4P-09-24-120				
4 Series	P- Material	09- Rung Spacing	24- Width	120 Length
Tava Modeli 4"	Malzeme P=Polyester Resin V=Vinylester Resin	Basamak Aralığı 06" 09" 12" 18"	Genişlik 06" 09" 12" 18" 24" 30" 36"	Uzunluk 120 (10ft.) 240 (20ft.)

To obtain deflection at any span length for lighter loads than listed, multiply the load by the K factor. When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%.

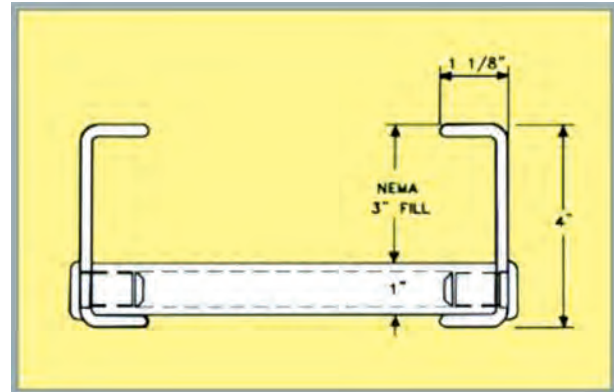


Husky Series 6C / NEMA 20C				Safety Factor 1.5	
Span (Ft.)	10	12	14	16	18
Design Load Lbs./Ft.	157	109	80	61	48
Deflection	2.1	3.0	4.0	5.3	6.7
K Factor	0.013	0.028	0.050	0.087	0.140
Loading—NEMA 12C *tested per NEMA FG-1, 12" rung spacing					

## Series 3

Numbering System • Katalog Kodu Oluşturma

3P-9-18-120				
Prefix				
3 Series	P- Material	9- Rung Spacing	18- Width	120 Length
Tava Modeli 3"	Malzeme P=Polyester Resin V=Vinylester Resin	Basamak Aralığı 06" 09" 12" 18"	Genişlik 06" 09" 12" 18" 24" 30" 36"	Uzunluk 120 (10ft.) 240 (20ft.)



To obtain deflection at any span length for lighter loads than listed, multiply the load by the K factor. When trays are used in continuous spans, the deflection of the tray is reduced by as much as 50%.

Husky Series 6C / NEMA 20C					Safety Factor 1.5
Span (Ft.)	6	8	10	12	14
Design Load Lbs./Ft.	257	145	93	64	47
Deflection	1.3	2.3	3.7	5.3	7.2
K Factor	0.005	0.016	0.040	0.083	0.153

Loading—NEMA 8C \*tested per NEMA FG-1, 12" rung spacing

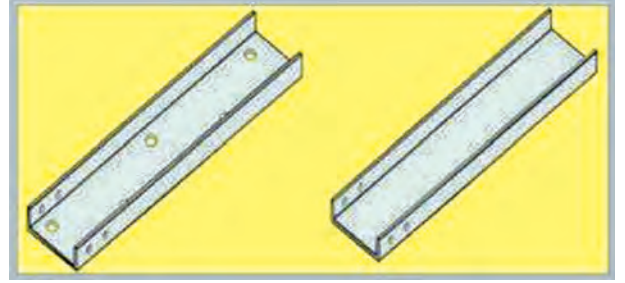


Numbering System • Katalog Kodu Oluşturma

FCC-VP-03-120			
FCC Series	VP- Material	03- Width	120 Length
Profil Tipi Ventilated = FCC Non-Ventilated = FCCN	Malzeme VP=Polyester Resin VV=Vinylester Resin	Genişlik 02" 03" 04" 06" 08"	Uzunluk 120 (10ft.) 240 (20ft.)

Husky Fiberglass Cable Channel Tray is available in Ventilated and Non-Ventilated Design and in Polyester or Vinylester material. The height information is listed below:

- 2"W - 1" High
- 3"W - 1" High
- 4"W - 1-1/8" High
- 6"W - 1-5/8" High
- 8"W - 2-5/16" High



Note: Splice plates are not included.

VENTILATED			
Polyester	Vinylester	Width (in.)	Length (ft.)
FCCVP-02-120	FCCVV-02-120	2	10
FCCVP-02-240	FCCVV-02-240	2	20
FCCVP-03-120	FCCVV-03-120	3	10
FCCVP-03-240	FCCVV-03-240	3	20
FCCVP-04-120	FCCVV-04-120	4	10
FCCVP-04-240	FCCVV-04-240	4	20
FCCVP-06-120	FCCVV-06-120	6	10
FCCVP-06-240	FCCVV-06-240	6	20
FCCVP-08-120	FCCVV-08-120	8	10
FCCVP-08-240	FCCVV-08-240	8	20

NON-VENTILATED			
Polyester	Vinylester	Width (in.)	Length (ft.)
FCCNP-02-120	FCCNV-02-120	2	10
FCCNP-02-240	FCCNV-02-240	2	20
FCCNP-03-120	FCCNV-03-120	3	10
FCCNP-03-240	FCCNV-03-240	3	20
FCCNP-04-120	FCCNV-04-120	4	10
FCCNP-04-240	FCCNV-04-240	4	20
FCCNP-06-120	FCCNV-06-120	6	10
FCCNP-06-240	FCCNV-06-240	6	20
FCCNP-08-120	FCCNV-08-120	8	10
FCCNP-08-240	FCCNV-08-240	8	20

Ek parçaları ayrı sipariş edilmelidir.

## Cable Tray Installation Guide

**Installation of MP Husky Fiberglass Cable Tray should be made in accordance with the standards set by NEMA Publication VE-2 latest edition and National Electrical Code, Article 392.**

- Always observe common safety practices when assembling tray and fittings. Installations generally require some field cutting. Dust created during fabrication presents no serious health hazard, but skin irritation may be experienced by some workers.
- Operators of saws and drills should wear masks, long sleeve shirts, or coveralls.
- Fabrication with Husky Fiberglass is relatively easy and comparable to working with wood. Ordinary hand tools may be used in most cases.
- Avoid excessive pressure when sawing or drilling. Too much force can rapidly dull tools and also produce excessive heat which softens the bonding resin in the Husky Fiberglass, resulting in a ragged edge rather than a clean-cut edge.
- Field cutting is simple and can be accomplished with a circular power saw with an abrasive cut-off wheel (masonry type) or hack saw (24 to 32 teeth per inch).
- Drill Husky Fiberglass as you would drill hard wood. Standard twist drills are more than adequate.
- Any surface that has been drilled, cut, sanded or otherwise broken, **must be sealed** with a compatible resin.
- Carbide tipped saw blades and drill bits are recommended when cutting large quantities.
- Support the Husky Fiberglass material firmly during cutting operations to keep material from shifting, which may cause chipping at the cut edge.
- Each tray section length should be equal to or greater than the support span.
- When possible, the splice should be located within the quarter span.
- Fittings should be supported as per NEMA VE-2.

## Recommended Fiberglass Cable Tray Specifications

### 1.0 Cable Tray Design

- 1.1 Cable Tray System shall be made of straight sections, fitting and accessories as defined in the latest NEMA standards publication FG-1.

### 2.0 Cable Tray Design

- 2.1 Straight section structural elements: side rails, rungs and splice plates shall be pultruded from glass fiber reinforced polyester or vinylester resin.
- 2.2 Pultruded shapes shall be constructed with a surface veil to ensure a resin-rich surface and ultraviolet resistance.
- 2.3 Pultruded shapes shall meet ASTM E-84, Class 1 flame rating and self-extinguishing requirements of ASTM D-635.

### 3.0 Construction

- 3.1 Straight section lengths will be 120 inches (10ft.) or 240 inches (20ft.) standard.
- 3.2 Side rails will be inward "C" configuration and be pre-drilled to accept splice plates.
- 3.3 Loading depths for cable tray systems shall be 5", 3", or 2" as per NEMA FG-1 tolerances. Overall heights shall be 6", 4", or 3" respectively.

### 4.0 Fittings

- 4.1 Molded fittings shall be formed with a minimum 3" tangent following the radius.
- 4.2 3" or 5" loading depth systems shall have 90° and 45° molded fittings in 12" or 24" radius.
- 4.3 All fittings not included in 4.2 should be of mitered construction.
- 4.4 Width-useable inside tray width shall be 6", 9", 12", 18", 24", 30", or 36". Outside width shall not exceed inside by more than a total of 2".
- 4.5 Straight and expansion splice plates will be of stainless steel or Husky Fiberglass design with an eight bolt pattern in 5" fill systems and four bolt pattern in 3" and 2" fill systems.
- 4.6 Dimension tolerances will be per NEMA FG-1.
- 4.7 Cable tray must have integral connection between side rails and rungs consisting of non-metallic mechanical fasteners and adhesive bonding.

### 5.0 Manufacture

- 5.1 All manufacturing practices will be in accordance with NEMA FG-1.





# MP HUSKY<sup>TM</sup>

CABLE TRAY & CABLE BUS  
K A B L O T A V A L A R I



POWER



MANUFACTURING



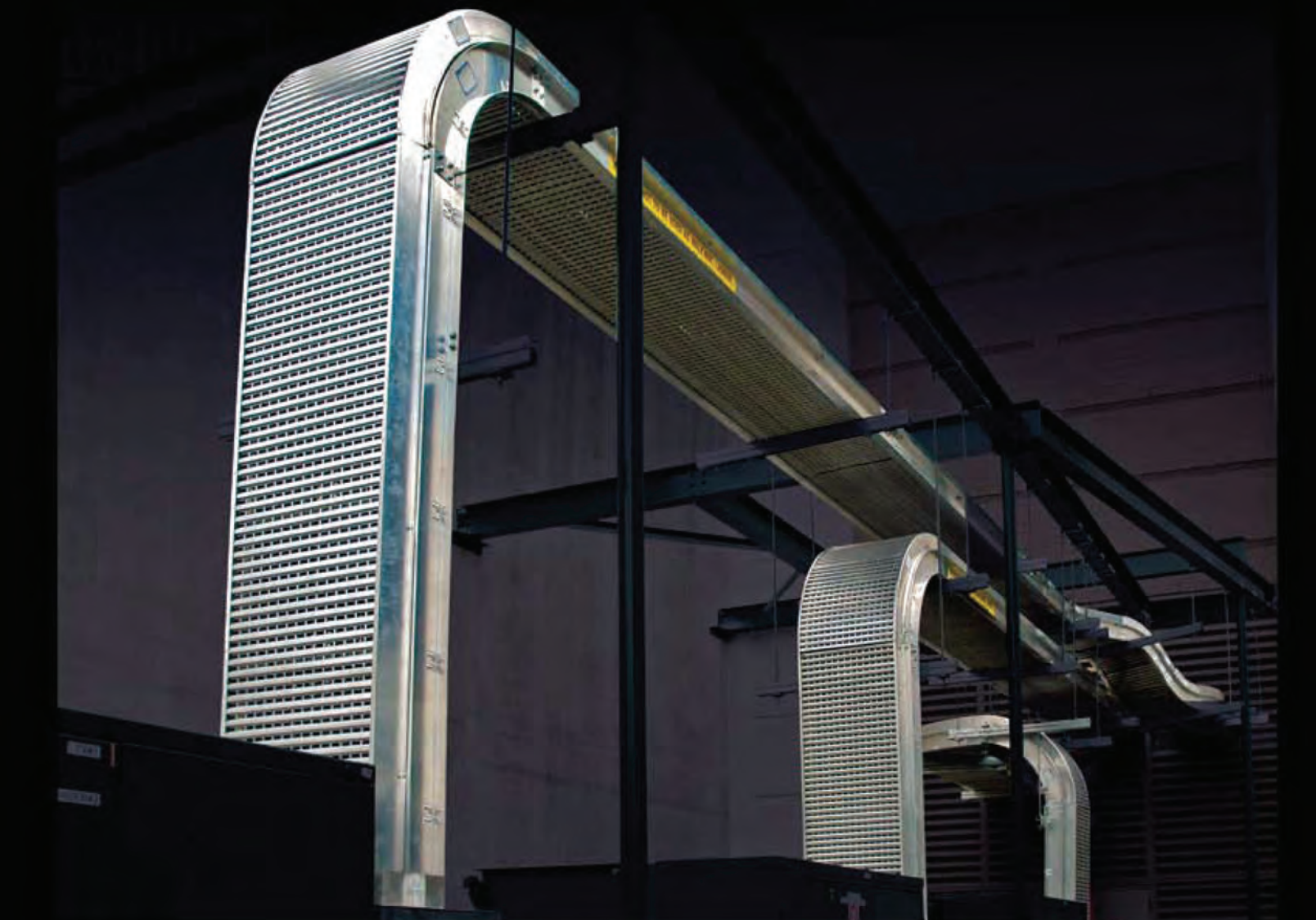
OIL & GAS



CHEMICAL

## CABLE BUS

The Most Reliable, Cost-effective, Flexible & Maintenance-Free Power Distribution System



MP Husky Cable Bus Systems are engineered and manufactured for superior reliability as well as to utilize less conductive material, providing significant savings versus non-segregated phase bus duct, conduit and wire, and other electrical feeders. As copper prices have continued to remain at historically high levels, the savings clients realize are even greater and more important. No matter how you look at it, MP Husky Cable Bus outperforms other electrical busways in reliability, cost and flexibility. See for yourself why more.

MP Husky Bus Sistemleri üstün güvenilirlikle daha az iletken kullanımı için tasarlanıp üretilmesinin yanı sıra, fazlara ayrılmamış sistemler, boruyla taşınan kablo sistemleri ve diğer enerji iletim sistemlerine göre çok daha ekonomiktir. Bakır fiyatlarının tarihsel olarak sürekli artması, kullanıcıların tasarrufun önemini daha fazla fark etmelerini sağlamıştır. MP Husky Cable Bus sistemleri güvenlik, maliyet ve uygulanabilirlik açısından daha üstündür.

## Decade after Decade Engineered to Outperform

## Onlarca Yıl Üstün Performans İçin Tasarlandı



### Significant Cost Savings

Free Air Rating allows greater ampacity with less copper - up to 40% less copper!

### Most Reliable

MP Husky Cable Bus utilizes continuous runs of power cable (no faulty splices) between terminations. More installations in more industries than any other manufacturer.

### Lowest installation costs

with parallel conductors for entire run. Our system does not interleave or transpose cables in the bus housing, this means it costs less to install.

**Field proven for 60 years** in the most extreme environments: Corrosive, Heavy Salt, Chemical, Cold (N. Canada), Hot (Saudi Arabia) and tropical locations.

### Free Air Rating

Ventilated top and bottom covers provide superior protection and ventilation.

### Certainty of Design

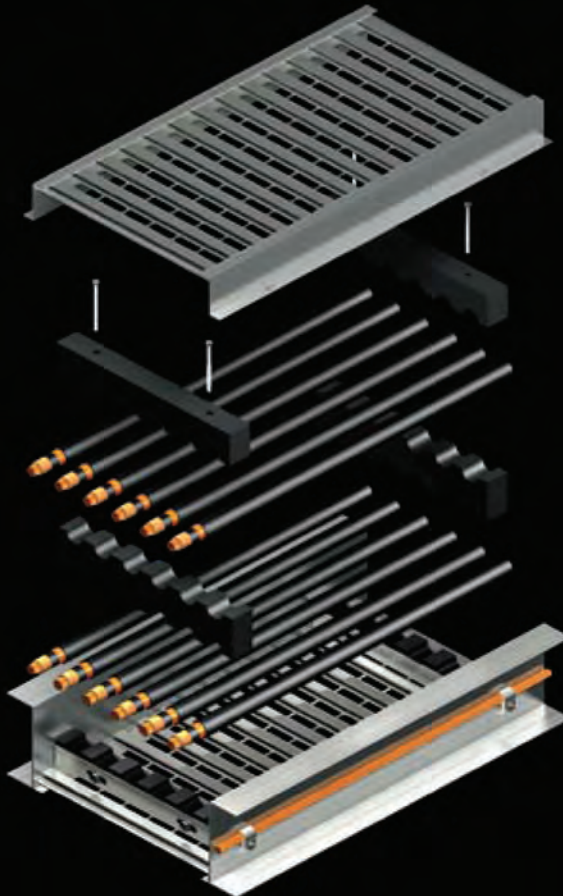
Cable Support Blocks provide continuous maintained spacing and short circuit bracing (100,000kA standard).

### Polymer Cable Support Blocks

will not decay, rot or lose structural integrity for 50+ years.

### Greater Flexibility

No Delays. Easily adjusted in the field to for changes and unforeseen obstacles.



### Önemli Maliyet Tasarrufu

Serbest Hava şartları daha az bakır! çok daha fazla akım taşımayı mümkün kılar- %40 a kadar daha az bakır!

### Serbest Hava Oranları

Hava akımı sağlayan alt ve üst kapaklar üstün bir koruma ve kabloların serbest havala şartları değerlerinde çalışmasını sağlar.

### En Güvenilir

MP Husky Cable Bus sistemi bağlantılar arasındaki ek yapılmamış güç kablolarının avantajlarını sunar. Diğer üreticilerden daha fazla uygulama alanında, daha çeşitli endüstride tercih edilmiştir.

### Daha düşük Montaj Maliyeti

Tüm sistemde paralel uygulanan iletkenlerle daha düşük maliyet sağlar. Kablo taşıyıcılarının içersisinde herhangi bir şekilde kabloların sırası ya da aralarındaki mesafe değişmez. Bu da daha düşük maliyet demektir.

### Risksiz Dizayn

Kablo Destek Blokları kablolar arasındaki boşluğun ve kısa devre desteğinin sürekliliğini sağlar (100,000kA standart)

### Polimer Kablo Destek Blokları

50 yıl ve daha fazla çürümez, yapısal özelliği değişmez.

### Mükemmel Uyum

Gecikme yok. Öngörülmemiş engeller ve değişikliklere sistemi çok hızlı değiştirerek uyumlu hale getirebilirsiniz.



## Features & Benefits

### Reliable

- Our system utilizes continuous runs of power cable (no faulty splices) from termination to termination.
- MP Husky utilizes high quality, factory insulated cables.
- Polymer cable support blocks (Fire Rated & Std) will not decay, rot or lose structural integrity for 50+ years.

### Lowest Cost

- Free Air Rating allows greater ampacity with less copper, achieving significant cost savings.
- Substantial savings on materials and installation costs compared to other systems.
- Industry exclusive radiused fittings **with tangents** provide easier, more cost effective and precise connections.

### Flexible & Adaptable

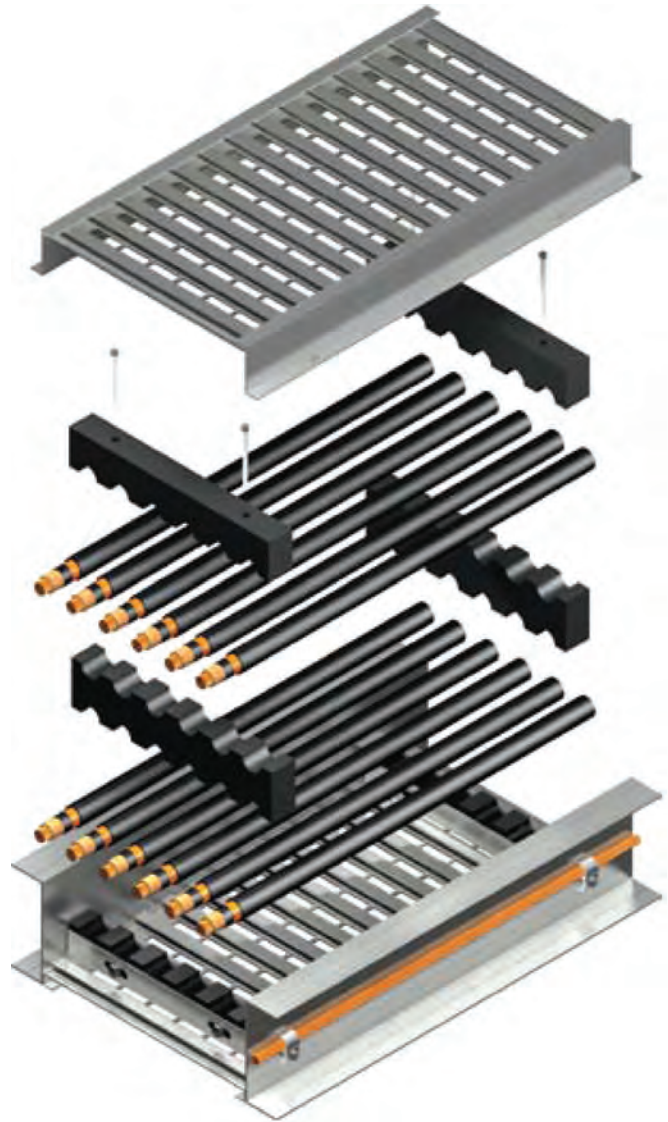
- Unlike non-segregated bus duct, MP Husky Cable Bus systems are easily adjusted in the field to accommodate misplaced equipment that often occur during construction.
- Easily routed around unforeseen field obstructions (i.e. piping, structural steel, equipment, etc.)
- Our extensive custom fabrication capabilities ensure that we can manufacture a system to meet all of your difficult coordination challenges.

### Free Air Rating for Conductors

- Up to 40% less conductive material (copper or aluminum) is needed to carry full rated current.
- Minimum temperature rise due to ventilated enclosure and maintained cable spacing by custom support blocks.
- Maximum ampacity in accordance with ICEA listings for 90 degree Celcius rated conductors.

### Indoor or Outdoor Applications

- Utilized for indoor or outdoor applications.
- No special finishes are required with housing available in Aluminum, Stainless Steel and HDGAF.
- Excellent protection against adverse environments including Paper Mills, Fossil, Chemical Plants, cold, hot and tropical locations.



### Testing and Certification

- The **only** CSA Certified Cable Bus system on the market. Certified to CSA 22.2 #27 (Busways) and 22.2 #201 (Metal Enclosed High Voltage Busways)
- Actual Heat Rise Tests on widest range of system ratings.
- Actual Short Circuit Tests up to 120kA RMS Symmetrical.
- Actual Heat Rise Test verifying MP Husky Cable Bus in trench applications.
- Actual Load Tests confirm structural capability of housing, including 20' spans

### Match-Marked Layout Drawings

- Cable Bus system layout drawings are shipped complete with match-marked numbers that correspond to each Cable Bus section.
- Product labels utilize large items numbers to facilitate quick product location and installation.

## Ürün Özellikleri ve Avantajları

### Güvenilir

- Sistemimiz bağlantılar arasında kabloyu kesintisiz olarak (ek yapmadan) kullanır.
- MP Husky yüksek kalitede kabloyu fabrikada montaj eder.
- Ploymer kablo destek blokları kullanır (Yanmaya dayanıklı) 50 yıldan fazla bozulmaz, çürümez ve yapısal özelliklerini kaybetmez.

### Düşük Maliyet

- Serbest Hava Şartları nedeniyle çok daha daha az bakırla daha fazla akım taşıma kapasitesine sahiptir, çok önemli miktarda bakır tasarrufu tasarruf sağlar
- Diğer kablo taşıma sistemleriyle karşılaştırıldığında çok önemli miktarda malzeme ve montaj maliyetini düşürür.
- Sistem tamamen düz bir satıha sahip olduğundan daha kolay, daha ucuz ve kusursuz eklenebilir

### Çok yönlü ve Uyarlanabilir

- Fazlara ayrılmamış sistemlerden farklı olarak, MP Husky Cable Bus sistemleri inşaat sırasında sıkça olan hata durumlarında kolayca yeniden ayarlanabilir.
- Sahada öngörülemeyen engellerin(tesisat borusu, inşaat demiri, teçhizat v.b) etrafından kolayca yeni bir hat düzenlenebilir
- Geniş özel imalat kapasitemizle sahada yaşayacağınız tüm zorlu saha şartlarına sistem üretebiliriz



### İletkenler için Serbest Hava Şartları

- %40 a kadar daha az iletken mazleme (bakır yada alüminyum) ile ihtiyaç duyulan akımın tamamı
- Havalamaya uygun yapı ve özel kablo destekleriye Sistem boyunca sürekli aynı kalan kablo aralıkları sayesinde minimum ısı artışı.
- 90°C ye kadar dayanıklı ICEA standart iletkenlerle mak Simum akım taşıma kapasitesi.

### İç Ortam ve Harici Uygulamalar

- Harici ve iç ortamlarda kullanılabilir
- Aluminum, paslanmaz çelik ve sıcak daldırma gövde saye farklı her iklim şartına uygundur.
- Kağıt fabrikası, Taş Ocağı, Kimyasal tesisler, soğuk sıcak ve tropical iklimler ve her türlü olumsuz çevre şart larında mükemmel koruma sağlar.

### Testler ve Sertifikalar

- Piyasadaki tek CSA sertifikalı üründür CSA 22.2#27 (Enerji İletim Sistemleri) ve 22.2#201 (Metal Gövdeli kapalı Enerji İletim Sistemleri)
- Güncel geniş bir aralığa sahip Isınma Testleri
- 120kA RMS e kadar kısa devre testi
- Güncel gömülü uygulamalar için doğrulama testleri
- 6 mt destek aralığında gövdenin yük kapasitesi testi.

### Ürün kodları ile Uygulama Projeleri

- Cable Sisteminin uygulama projeleri üretilen her parçaya karşılık gelecek şekilde kodlanarak projeye yerleştirilir..
- Kod numaraları her ürünün üzerine kolay montaj ve tanıma için büyük rakam ve harflerle yazılı olarak sevk edilir.



## Labor Savings

- Cables run in parallel throughout entire bus housing.
- Our system does not interleave or transpose cables in the bus housing.
- Lightweight, ventilated enclosure that two men can easily lift 12' or 24' length into position.
- No special heavy erection equipment required.

## Safe

- MP Husky Cable Bus is an all welded rigid construction.
- Workmen free of shock hazards - no exposed bus elements, only insulated conductors used.
- Ventilated design prevents entry of foreign objects.
- Support block design assures proper arrangement of conductors.

## Less Support Material

- Design criteria accomplishes high load carrying ability on long spans with minimal support material.
- Flush bottom design allows for use of standard support material.

## Complete System

- MP Husky Cable Bus systems are complete with all necessary fittings for direction and elevation changes.
- Termination boxes, equipment seals, firestops and bus flanges (including weatherproof boxes-NEMA 4X).
- Lugs, termination kits and adapter bus bars.

## Factory Fabricated - All Welded

- Bottom cable support block is factory pre-installed in Cable Bus Housing.
- Entire system is factory fabricated to fit the specific requirements of each individual project.
- All welded constructed for maximum strength.

## Engineering Services

- Experienced and knowledgeable engineering group that can handle difficult coordination challenges.
- Job specific testing and application engineering.



- Engineering support prior to and during engineering & construction, as well as during and after start-up.
- Other engineering services available.

## Proper Phase Balance

- MP Husky utilizes an Inductive Reactance Program to achieve the proper cable spacing and phasing arrangement that ensures low impedance and low voltage drop.
- Balanced load carrying of conductors prevents over-heating of cables.
- Cable support blocks provide continuous maintained spacing.

## Tangents

- Industry Exclusive - Faster, easier install.
- Cleaner connection between fittings & straights.
- Tangents on fittings provide flat area for faster, easier connection to supports.
- Precise fitting to fitting connections when required.



## İşçilik Tasarrufu

- Kablolar taşıyıcı gövdenin içerisinde tüm sistem boyunca devam eder.
- Taşıyıcı gövdenin herhangi bir yerinde kablolar yer değiştirmez ya da atlama yapmaz.
- Hafif , havalandırılmış gövdeler iki kişi tarafından kolayca kaldırılabilir ve yerleştirilebilir.
- Özel ağır montaj ekipmanları gerektirmez.

## Güvenli

- MP Husky Cable Bus sistem gövdesi kaynaklı imalattır.
- Sadece izoleli iletkenler kullanıldığından elektrik çarpması riski yoktur.
- Havalandırma tasarımı yabancı cisimlerin içeri girmesini engeller.
- Destek bloklarının dizaynı kabloların tüm hat boyunca düzgün bir şekilde yerleşmesini sağlar.

## Daha Az Destek Malzemesi

- Dizayn hesaplamaları uzun destek aralıklarında minimum destek malzemesiyle yüksek taşıma kapasitesi sağlar.
- Çıkıntısız taban dizaynı standart destek malzemeleri kullanmaya olanak sağlar, özel imalat gerektirmez.

## Eksiksiz Sistem

- MP Husky Cable Bus Sistemleri montaj hattına uygun tüm gerekli yön ve seviye değiştirme elemanları ile sevk edilir.
- Gerekli elektrik bağlantı kutuları, contalar, yangın durdurucular, ek bağlantıları ile (harici ortam kutuları dahil) sevk edilir.
- Gerekli kablo pabuçları, kablo ek mufları ve adaptörleri ile birlikte sevk edilir.

## Fabrikada Montaj-Tamamı Kaynaklı

- Kablo taşıyıcı bloklar gövdenin içerisine fabrikada monte edilir.
- Tüm sistem her bir projeye özel fabrikada üretilir.
- Tüm kaynaklı yapı maksimum dayanıklılıkta imal edilir.
- Tüm gövde maksimum dayanım için kaynaklı imal edilir.

## Mühendislik Hizmeti

- Projelerdeki uyum sorunlarını çözmek için deneyimli ve eğitimli mühendislik ekibi.



- Projeye özel test ve uygulama mühendisliği.
- Tasarım, inşaat, devreye alma sırasında ve sonrasında mühendislik desteği.

## Düzgün Faz Dengesi

- MP Husky Endüktif Reaktans Programı, en uygun kablo aralıkları ve faz ayarlaması ile düşük empedans ve düşük gerilim kaybını garanti eder.
- İletkenlerdeki dengeli yük kablonun aşırı ısınmasını engeller.
- Kablo destek blokları sistem boyunca kablolar arasındaki mesafenin korunmasını sağlar.

## Tam Bağlantı

- Sektördeki en hızlı, en kolay kurulum.
- Sistemin gövde ve dönüş bağlantıları pürüzsüzdür.
- Bu pürüzsüz bağlantılar, destek sistemlerinin hızlı ve kolaylıkla montajını sağlar.
- Aksesuarların bir birine montajı gerektiğinde kusursuz bağlantı sağlanır.



## Technical Information

Selection of the proper Cable Bus system must be undertaken with care to assure that it compliments the design of the overall electrical power system.

### Electrical Design

To ensure an efficient, dependable, high quality installation, every MP Husky Cable Bus System is fully engineered with particular emphasis placed on CABLES, SYSTEM BALANCE, SHORT CIRCUIT CAPABILITY, and GROUNDING REQUIREMENTS. Each one of these key design considerations must be analyzed separately to determine how they affect the overall system design.

### Parallel Conductors

Parallel conductors (more than one per phase) can be used to an advantage in Cable Bus where large conductor sizes are encountered. The ampacity per circular mil of conductor decreases as the circular mil of conductor increases. Smaller conductors running parallel are more flexible during installation and have greater current carrying capability than fewer, larger conductors.



### Voltage Drop

Proper system design dictates that voltage drop be considered for both the power feeders separately as well as the entire power system. A voltage drop of 3-4% for power feeders and an overall of 5% or less for the entire system are considered to be within acceptable limits. Cable Bus is designed for low-voltage drop. Voltage drop data is available upon request, for your specific system.

### Shielding

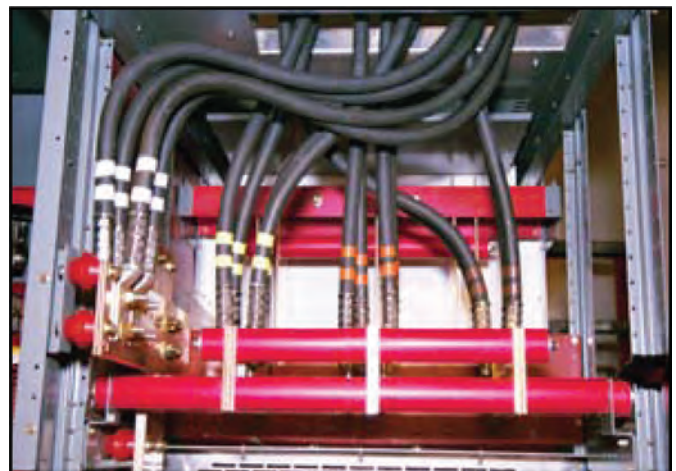
Shielding is used on power cables to confine the dielectric field of the conductor to the cable insulation. Shielded Power Cables are used in Cable Bus for applications above 2500 volts and when any of the following conditions exist:

1. Where cables are subject to soot or other heavy deposits that may form paths to ground.
2. Where electrostatic discharge can effect nearby computerized control cables or other low level signals.
3. Concern for personnel safety.

When installing shielded cable the metallic shielding must be solidly grounded and the installation must be studied to determine the best grounding method. This is necessary as voltage is induced in the shield of a single conductor cable carrying alternating current due to mutual inductance between its shield and any other conductor in its vicinity. This induced voltage can result in two conditions:

1. Metal shields bonded or grounded at multiple points creates shield to ground circulating currents. The magnitude of the circulating currents depends on the mutual inductance to the other cables, the current in these conductors, and the resistance of the shield.
2. Shields bonded or grounded at only one point will have a voltage build up in the sheath but will eliminate circulating currents.

The length of the circuit and the load conditions will indicate which of the above shielding methods is required for any particular reason. MP Husky's engineers can provide shield voltage calculations to aid the client in choosing the best grounding method.





## Teknik Bilgiler

Cable Bus Sisteminin seçiminde ürünün, projenin tüm güç sisteminin dizaynına uyduğu garanti altına alınmalıdır.

### Elektriksel Tasarım

Etkili, güvenilir, yüksek kalitede bir uygulama için KABLO, SİSTEM DENGESİ, KISA DEVRE KAPASİTESİ ve TOPRAKLAMA ihtiyaçları tek tek dikkatle tasarlanır. Tüm bu considerations dikkate alınacak değerlerin sistemin tamamını nasıl etkileyeceği ayrıca belirlenir.

### Paralel İletkenler

Büyük kesitli tek bir iletken yerine çok sayıda paralel iletken kullanmak (faz başına birden fazla olmak üzere) Cable Bus'ta avantajlı bir durum ortaya çıkarır. İletken kesiti arttıkça, mm<sup>2</sup> başına düşen akım taşıma kapasitesi azalır. Ancak, daha çok sayıda daha küçük kesitli iletkenlerle akım taşımak hem daha pratik bir uygulamadır hem de tek başına yüksek kesitli iletkenlerden daha yüksek akım taşıma kapasitesi sağlar.



### Gerilim Kaybı

Düzgün bir sistem hem her bir hattın hemde tüm sistemin gerilim düşümünü dikkate almayı zorunlu kılar. Hatlar için %3-4 ve sistemin tamamı için %5 ve daha altı kabul edilebilir limitler sayılır. Cable bus sistemleri düşük gerilim kaybı değerlerine göre tasarlanır. Talep edildiğinde sisteminizin gerilim düşüm hesapları verilir.

### Kablo Ekranı

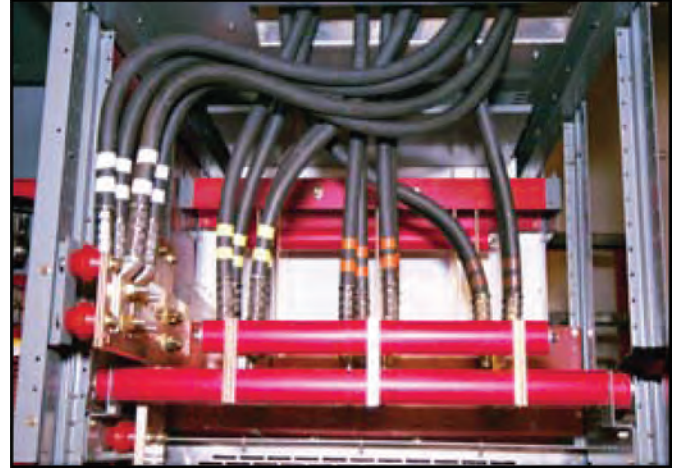
Kablo ekranı, kablo kılıfında yalıtkan alan oluşturmak için kullanılır. Ekranlı güç kabloları 2500 voltun üzerinde enerji iletimlerinde ve aşağıdaki şartlarda kullanılır:

1. Baca işi gibi, ya da daha ağır birikintilerin bulunduğu toprak içine gömülme durumunda.
2. Elektrostatik boşalmanın yakındaki data ve düşük sinyalli kabloları etkile olasılığı durumlarında.
3. İnsan güvenliği için.

Ekranlı kabloların uygulanması sırasında kablonun kılıfındaki metal sağlamca ve en iyi yöntemle topraklanmalıdır. Bu, ekran ve çevresindeki diğer iletkenler arasındaki karşılıklı endüktansa bağlı olarak alternatif akım taşıyan tek damarlı kablonun ekranında voltaj indüklenmesi nedeniyle gereklidir. Bu voltaj indüklemesi aşağıdaki iki şartı oluşturabilir:

1. Ekranın bir çok noktadan topraklanması ekrandan toprağa bir dolaşım akımı yaratır. Dolaşım akımının büyüklüğü diğer kabloların karşılıklı indüksiyonuna, bu iletkenlerdeki akıma ve ekranın direncine bağlıdır.
2. Ekranın tek bir yerden topraklanması voltajın kablo kılıfında büyümesine fakat dolaşım akımının yok olmasına sebep olur.

Hattın uzunluğu ve yük şartları hiç sebep yokken yukarıdaki ekranlama tipini gerektirir. MP Husky mühendisleri müşterilerinin en uygun topraklama yöntemini seçebilmesi için ekran voltajının hesaplarını müşterilerine bildirir.





## Technical Information

### System Balance

Cable Bus is a power distribution system using insulated single conductor power cables with support blocks that maintain cable spacing. Each phase consists of one or more cables connected in parallel. The complete assembly is enclosed in a ventilated aluminum or steel enclosure for support and protection.

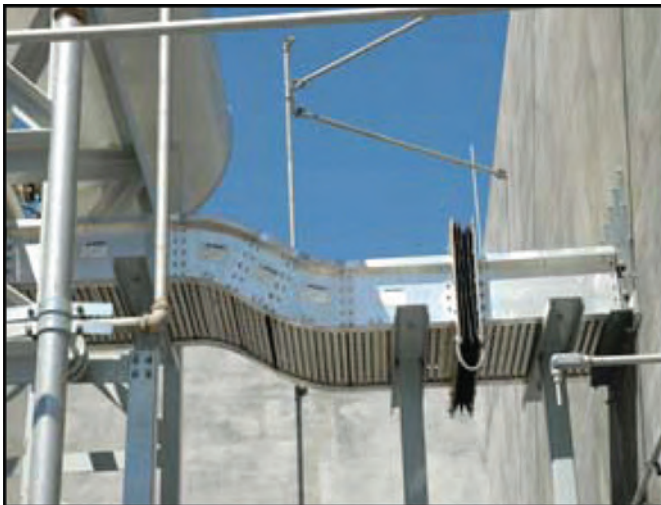
Parallel conductor transmission lines, using widely spaced conductors, have been in use for many years. The electrical coupling between the conductors of a parallel conductor system, which is a function of the geometry of the location of the conductors, can cause an imbalance in the conductor currents. In a widely spaced overhead transmission line transposition of conductors can economically be used to balance the conductor currents.

The spacing of the conductors in Cable Bus is one cable diameter, (i.e. one to three inches), as compared to the typical value of thirty feet used in overhead lines. This close spacing and the relatively short lengths, as compared to hundreds of miles for overhead lines, make the transposition of conductors within the bus housing a difficult challenge and sometimes practically impossible.

The objective of the Cable Bus design is to obtain the optimum balance for an electrical circuit using parallel conductors (no transposition) with close spacing. MP Husky has developed an Inductive Reactance Program which

MP Husky Cable Bus is designed for balance of conductors within a phase (intra-phase) and balance between the phases (inter-phase). Many phasing arrangements will provide inter-phase balance of currents due to the load impedance, but the majority of these phasing arrangements provide intra-phase current imbalance.

MP Husky's Cable Bus design provides a phasing arrangement that achieves inter-phase current balance, as well as intra-phase current balance, therefore reducing the amount of parallel conductor imbalance to a minimum.



### Short Circuit Capacity

A Cable Bus system must be able to withstand the dangerous mechanical forces created by short circuit currents. These forces are transmitted from the conductors to the cable supports. In the case of Cable Bus, the support elements include the support blocks and enclosure.

Short circuit currents are made up of two parts; a symmetrical AC component and a rapidly decreasing DC component, (Fig. 5 on next page). A Cable Bus system must be selected so that its mechanical strength will withstand the maximum instantaneous current and to a lesser degree the 5-8 cycle resultant symmetrical current. The symmetrical current is the actual value that a high voltage breaker will interrupt.

solves for the line and phase currents of a parallel conductor system using a mathematical model of the transmission line parameters. Through the use of computer programs and verification by laboratory and field testing, MP Husky has designed Cable Bus Systems with minimal imbalance.

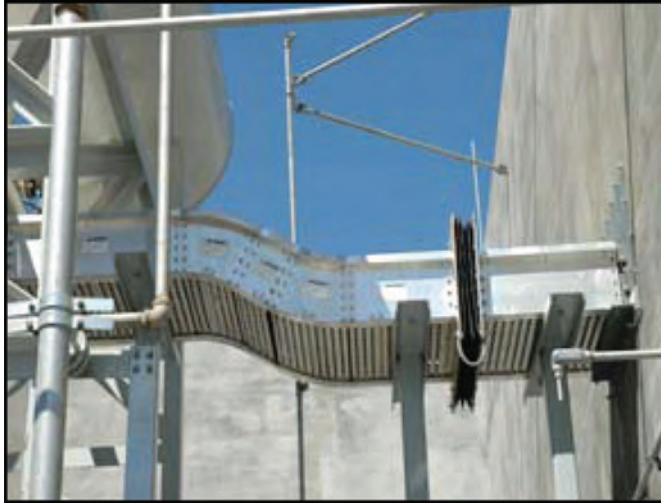
## Teknik Bilgiler

### Sistem Dengesi

Cable Bus Sistemleri izolasyonlu kablo taşıyıcıları ile , sistemin tamamında aynı aralıklarla taşınmış tek damarlı kablolarla güç elektrik dağıtımını yapan sistemlerdir. Her faz bir yada daha fazla kablonun paralel olarak birleştirilmesinden oluşur. Tüm montaj havalandırılmış alüminyum ya da çelik muhafazaların içinde desteklenir ve korunur.

Paralel enerji iletim hatları geniş aralıklarla yerleştirilmiş iletkenlerdir, uzun yıllardır kullanılmaktadır. Bir paralel iletken sistemindeki iletkenler arasında yer alan ve bu iletkenlerin konumlarının geometrisinde bir fonksiyon olan elektriksel ekleme iletkenlerdeki akımda düzensizliklere sebep olabilmektedir.

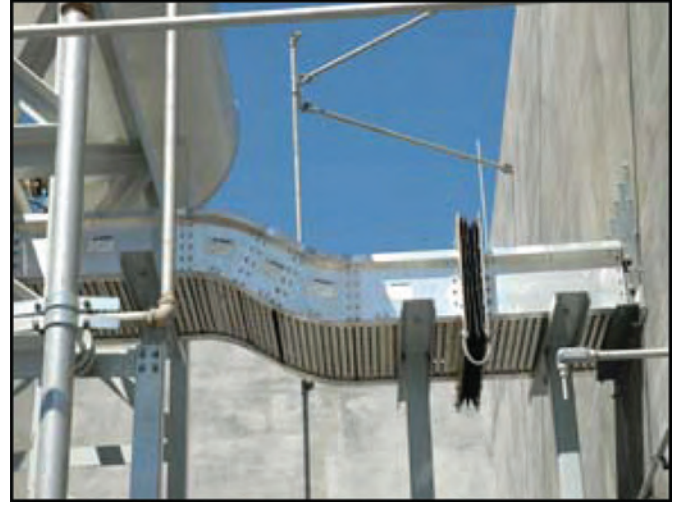
Cable Bus içindeki iletkenler arası mesafe, yüksek gerilim hatlarında kullanılan otuz feetlik kabloların tipik değerlerine kıyasla bir kablo çapı kadar olacaktır (örneğin bir ila üç inç arası) Yüzlerce millik yüksek gerilim hatları dikkate alındığında, kısa aralıklı mesafeler ve nispeten kısa boylar, hat içindeki iletkenlerin taşınmasını oldukça zorlaştırmakta hatta bazen imkansız kılmaktadır.



Cable Bus'ın tasarım amacı kapalı sistemlerle (boru, trenç, kablo tavası etc) paralel iletkenlerle (aktarım olmadan) optimum elektriksel dengesi sağlamaktır. MP Husky, paralel iletken sistemin hat ve faz akımlarını, iletim hattı parametrelerinin matematiksel bir modelini kullanarak çözen, Endüktif Reaktans Programını geliştirdi. MP Husky bilgisayar programları kullanılarak laboratuvar ve saha testleri ile doğrulama yoluyla , minimum dengesizlikle Cable Bus Sistemleri'ni tasarlamıştır.

MP Cable Bus, iletkenlerin dengesi için bir faz (faz içi) ve fazlar arasındaki dengeli (fazlar arası) sağlamak için tasarlanmıştır. Birçok ayarlama yükün empedansı nedeniyle arafaz dengesini sağlar fakat bu faz ayarlamaların çoğunluğu faz içi akım dengesizliğine sebep olur.

MP Husky Cable Bus tasarımı, fazlar arası akım dengesi ve aynı faz içi akım dengesi sağlayan bir faz düzenleme yaparak paralel iletken dengesizliğini minimum indiri.



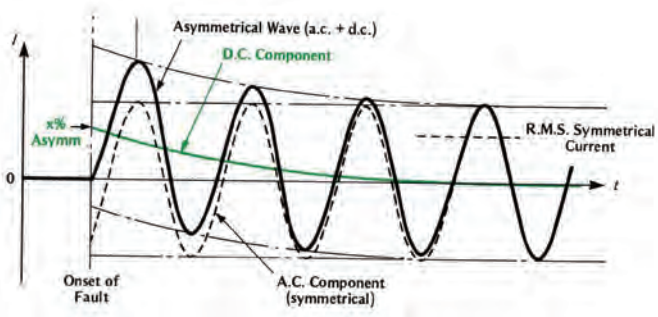
### Kısa Devre Kapasitesi

Bir Kablo Bus sistemi, kısa devre akımlarının yarattığı tehlikeli mekanik kuvvete dayanabilmelidir. Kısa devre halinde iletkenlerde oluşan kuvvet kablo desteklerine iletilir. Cable bus , destek elemanları destek blokları ve muhafazayı içerir.

Kısa devre akımları asimetrik AC bileşeni ve hızla azalan DC bileşeni olmak üzere iki kısımdan oluşur. Bir Cable Bus sistemi, mekanik mukavemeti maksimum anlık akıma ve daha düşük bir dereceye kadar 5-8 çevrimle sonuçta simetrik akıma dayanacak şekilde seçilmelidir. Simetrik akım, yüksek voltaj kesicisinin kesebileceği gerçek değerdir.

## Technical Information

Since Cable Bus is often used for main feeder connections, (e.g. substation, generator or transformer to switchgear, load centers and high voltage machines), the available short circuit current will be that of the utility or generator supply through the transformers. In some cases, the Cable Bus feeds large motors and the motor contribution to short circuit must also be considered. Numerous tables are available listing motor contributions for various operating conditions.



Available fault currents can be limited to some extent by conductor impedance. The impedance can be in the form of either conductor length, size or a combination of both.

The MP Husky Cable Bus design ignores these added conductor impedance; instead the worst fault conditions are always assumed. For design consideration a three phase short circuit current will result in the maximum mechanical forces for design considerations.

If Cable Bus is fed directly from the utility company service then short circuit current data will be available from the utility.

Where motor contributions are considered, the fault current due to the motor feedback will be a function of the voltage and is usually expressed as multiples of the motor full load current. NEMA standards are available which list these factors. Certified tests have been conducted to determine the short circuit performance of Cable Bus using various supporting arrangements.

## Short Circuit Testing

The Cable Bus systems were tested on a 600 volt, 3 phase, 60Hz circuit having a power factor of less than 0.20. One end of the Cable Bus was connected to the source terminals and the other was short circuited to create a three phase bolted fault.

Each test was conducted for a minimum of six cycles. Oscillograms recorded the phase currents during the test. Still photographs and high speed color motion pictures were taken relevant to the test.

MP Husky Cable Bus has been subjected to currents of 39.000, 67.500, 85.000, 100.000 and 120.000 RMS symmetrical amperes with asymmetrical currents greater than 200.000 amperes. Cable Bus withstood the mechanical forces of the test without any damage to the cables, support blocks or enclosure.

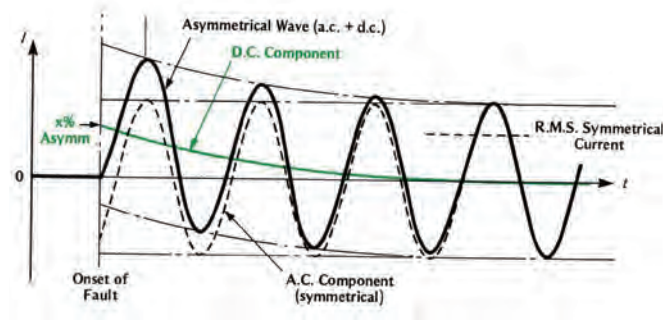


**MP Husky 4000Amp, 5kV Cable Bus system with open air termination to GSU transformer.**



## Teknik Bilgiler

Cable Bus , ana besleyici bağlantıları için sıklıkla kullanıldığından (Örn. Şalter, yük merkezleri ve yüksek gerilim kullanan makineler için trafo, jeneratör veya transformatör) kullanıldığından , mevcut kısa devre akımı, transformatörler vasıtasıyla şebeke veya jeneratör arzıniki ile eşdeğer olacaktır.Bazı durumlarda cable bus büyük motorları besler ve kısa devreye motorun etkisi de düşünülmelidir. Çeşitli çalışma koşulları için motor katkılarını listeleyen birçok tablo bulunmaktadır.



Mevcut arıza akımları bir dereceye kadar iletken empedansı ile sınırlandırılabilir. Empedans, iletken uzunluğu, boyutu veya her ikisinin birleşimi şeklinde olabilir.

MP Husky Cable Bus tasarımı, eklenen bu iletken empedansını yok sayar, bunun yerine her zaman en kötü değerlerin olacağını varsayarak bunları kullanır. Tasarım değerlendirmesi için üç fazlı bir kısa devre akımının maksimum mekanik kuvvetle sonuçlanacağı varsayılır.

Cable Bus Sistemi doğrudan şebekeden beslenirse, kısa devre akım verileri enerjiyi sağlayan şirketten edinilebilir.

Motorun kısa devreye katkıları düşünüldüğünde, motor geri bildiriminden kaynaklanan arıza akımı, gerilimin bir fonksiyonu olur ve genellikle motorun tam yük akımı katları olarak ifade edilir.Bu faktörleri sıralayan NEMA standartı listeleri vardır. Çeşitli destekleyici düzenlemeleri kullanarak Cable Bus sisteminin kısa devre performansını belirlemek için sertifikalı testler yapılmıştır.

## Kısa Devre Testleri

Cable Bus sistemleri, 0.20'den düşük bir güç faktörüne sahip olan 600 volt, 3 fazlı, 60 Hz'lik bir devrede test edilmiştir. Cable Bus bir ucu, bir enerji kaynağına , diğer ucu bir civataya bağlanarak üç fazlı sistemde bir kısa devre yaratıldı.

Her bir test en az altı döngü için yürütülmüştür. Osilogramlar test sırasında faz akımlarını kaydetti. Testler ilgili sonuçlar hareketsiz fotoğraflar ve yüksek hızlı renkli hareketli resimler olarak kaydedildi.

MP Husky Cable Bus sistemi, asimetrik akımlar 200.000 amperden büyük olan 39.000, 67.500, 85.000, 100.000 ve 120.000 RMS simetrik amper akımlarına maruz kalmıştır. Sistem, kabloların, destek bloklarının veya muhafazanın hasar görmeden testte oluşan mekanik kuvvetlere dayanmıştır.



**MP Husky 4000Amp, 5kV Kablo Bus sistemi, GSU trafo için açık hava sonlandırması ile.**



## Technical Information

### Grounding

A Cable Bus system must afford protection to life and property against faults caused by electrical disturbances. Lightning, electrical system failures, as well as failures in the system connected equipment all constitute possible fault hazard locations.

For this reason, all metal enclosures of the system, as well as non-current carrying or neutral conductors should be tied together and reduced to a common potential. This includes the structural steel of the building, water, steam and gas piping.

There are two distinct divisions to the system and equipment grounding problem. The system ground is the connection of the distribution system to earth by means of a neutral or grounded conductor and system grounding serves to limit the voltage, which might appear on the circuit due to lightning or accidental contact.

Cable Bus systems should be grounded to the substation structure and thus to the substation ground grid and to the building steel by means of the Cable Bus support materials. Cable Bus should also be grounded to the equipment or switchgear enclosure.



It is an accepted fact that ground currents tend to concentrate near power conductors and that cable enclosures take a large portion of the ground currents; therefore, it is important to consider Cable Bus as a major carrier of ground currents.

MP Husky's Cable Bus enclosure is rated to carry 1600A ground current. Extra ground current capacity can be provided by the application of external ground conductors bonded to each section of Cable Bus housing.



### Flexibility

MP Husky Cable Bus systems are flexible and adaptable to the many unexpected circumstances that occur during construction. Every size and rating of Cable Bus provided is supplied with up to 5% extra cable as well as one spare length of housing including cover, cable support blocks and hardware. This enables the installer to adjust our system in the field to discrepancies or differences between engineering drawings and actual field construction, with little or no delay of the project. And our compact design and radius bends allow our system to maneuver around and fit in tight clearance applications.



## Teknik Bilgiler

### Topraklama

Bir enerji iletim hattı, elektriğin sebep olduğu olumsuz etkiler karşısında ömrünü ve özelliklerini korumalıdır. Yıldırım, elektriksel sistem arızaları, bunlara ilaveten sisteme hatalı bağlanan ekipmanlar tehlikeli durumlara sebep olurlar.

Bu nedenle, sistemin tüm metal muhafazaları ve de akım taşımayan iletkenler veya nötr iletkenler birlikte bağlanmalı ve normal güce düşürülmelidir. Bu inşaat demiri, su, buhar ve gaz borulamasını da içerir.

Sistem ve bağlı ekipmalara ait topraklama ile ilgili iki belginin problem var. Sistem topraklaması dağıtım sisteminin nötr ya da topraklama iletkenleri ile bağlanması olup yıldırım veya kazara temas sonucu devrede oluşacak voltajı sınırlamaya yarar.

İletim sistemleri trafo merkezi binasına bağlanarak topraklanmalı, böylece trafo mekezi ve bina çeliği Cable Bus Sisteminin destek malzemeleri vasıtasıyla topraklama ana ringine bağlanmış olacaktır.



Zemin akımlarının güç iletkenlerinin yakınında yoğunlaştığı ve kablo muhafazalarının toprak akımlarının büyük bir bölümünü aldığı kabul edilen bir gerçektir; Bu nedenle Kablo Taşıyıcıları büyük toprak akımı taşıyıcısı olarak düşünülmesi önemlidir.

MP Husky'nin Kablo Kanalı muhafazası 1600A toprak akımı taşıması için derecelendirilmiştir. Kablo Yolu muhafazasının her bölümüne bağlı harici topraklama iletkenlerinin uygulanmasıyla ek toprak akımı kapasitesi sağlanabilir.



### Esneklik

MP Husky Cable Bus sistemleri esnekler ve inşaat sırasında meydana gelen beklenmedik durumlara uyarlanabilir. Yapılan tüm Cable Bus'lar her boyutu ve derecesi, kapak, kablo destek blokları ve donanım da dahil olmak üzere %5'e varan ek kablo ile birlikte bir adet yedek uzunlukla birlikte verilir. Bu, yükleyicinin, kurulum alanında sistemimizi, projenin çok az gecikmeyle veya zamanında yetişmesiyle, mühendislik çizimleri ile gerçek saha yapımı arasındaki tutarsızlıklara veya farklılıklara göre ayarlamasını sağlar. Kompakt tasarımı ve eğimli kıvrımlarımız sistemimizin manevra yapabilmesini ve sıkça temizleme uygulamalarına uyumu sağlar.



## Ampacity Comparisons • Akım Taşıma Karşılaştırması

This table illustrates the greater current carrying capacity of MP Husky Cable Bus as compared to alternate methods. The increased capacity is due to free air ventilation and engineered cable spacing and balance phasing arrangement.

Based on NEC & ICEA Tables at 90 degrees Celcius in 40 degree Ambient.

NEC & ICEA ya göre 90°C kablo sıcaklığı ve 40°C ortam sıcaklığında.

	Conductor Size	MP Husky Cable Bus	Interlocked Armored Cable (in Tray)	Three Single Conductor Cables in Conduit (in Air)
600V System	500 MCM	637 Amps	405 Amps	477 Amps
	750 MCM	805 Amps	500 Amps	598 Amps
	1000 MCM	960 Amps	585 Amps	689 Amps
5kV System	500 MCM	695 Amps	425 Amps	473 Amps
	750 MCM	900 Amps	525 Amps	579 Amps
	1000 MCM	1061 Amps	590 Amps	659 Amps
15kV System	500 MCM	685 Amps	470 Amps	481 Amps
	750 MCM	885 Amps	570 Amps	588 Amps
	1000 MCM	1040 Amps	650 Amps	677 Amps
600V Systems (Canadian)	500 MCM	594 Amps	355 Amps	355 Amps
	750 MCM	760 Amps	450 Amps	450 Amps
	1000 MCM	900 Amps	526 Amps	526 Amps

Bu tablo, alternatif yöntemlerle karşılaştırıldığında MP Husky Cable Bus sisteminin daha büyük akım taşıma kapasitesini göstermektedir. Serbest hava şartları, tasarlanmış kablo aralığı ve faz dengelerinin düzenlenmesi sayesinde daha fazla akım taşıma kapasitesi sağlanmıştır.

## Voltage & Ratings • Voltage & Güç

MP Husky Cable Bus Typical Voltage & Current Ratings

Mp Husky Cable Bus Örnek Voltaj ve Akım Kapasiteleri

	800A	1200A	1600A	2000A	2500A	3000A	3500A	4000A	5000A	6000A	7000A
69kV											
45kV											
25kV											
15kV											
5kV											
600V											

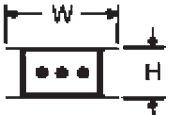
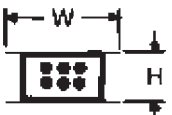
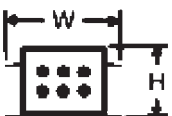
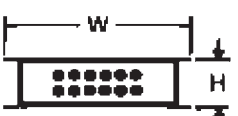
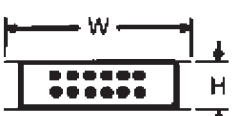
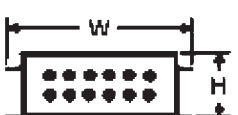
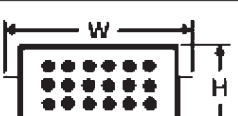
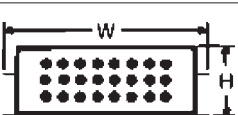
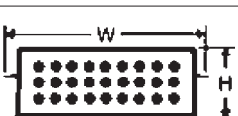
KEY

	Definite Cost Savings on these Available Ratings
	Possibly Available or Economical, Consult Factory
	Typically Outside Practical or Economical Range

ANAHTAR

	Mevcut Güçlerle Net Maliyet Tasarrufları
	Muhtemelen Mümkün veya Ekonomik, Fabrikayla Görüşün
	Genellikle Pratik veya Ekonomik Aralığın Dışında

## Common Cable Bus Systems 600 V • Yaygın Cable Bus Sistemleri 600 V

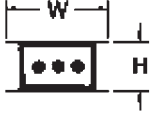
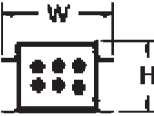
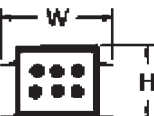
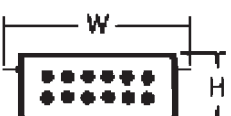
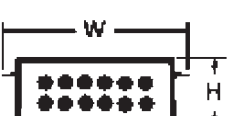
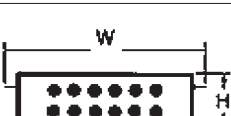
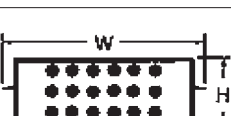
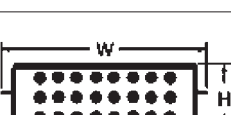
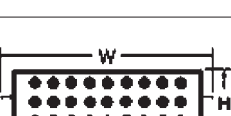
TYPICAL CROSS SECTION	SYSTEM AMPACITY	HEIGHT (H)	WIDTH (W)	# OF CONDUCTORS PER PHASE
	800A	6"	12 1/2"	1-750 MCM
	1200A	6"	12 1/2"	2-500 MCM
	1600A	8"	12 1/2"	2-750 MCM
	2000A	6"	21 1/2"	4-500 MCM
	2500A	6"	21 1/2"	4-500 MCM
	3000A	8"	21 1/2"	4-750 MCM
	4000A	10"	21 1/2"	6-750 MCM
	5000A	10"	27 1/2"	8-750 MCM
	6000A	10"	27 1/2"	9-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For CSA equivalent data please contact the factory.
- For additional amperage and voltage requirements please contact the factory.

- Yukarıda sistemler 3P topraklamasız sistemleri gösterir
- Sistemler topraklamalı ya da topraklamasız tamamı, yarısı yada bazı bölümleri 3P +N olarak üretilebilir.
- Aynı taşıyıcı içindeki devreleri birleştirmek mümkündür.
- CSA'ya eşdeğer veriler için lütfen satış temsilcinizle temasa geçin.
- İlave amper ve voltaj gereksinimleri için lütfen satıcınızla temasa geçin.



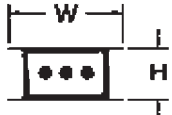

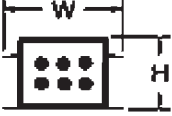
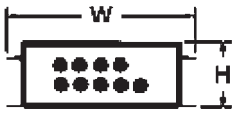
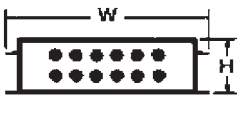
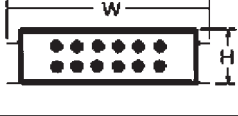
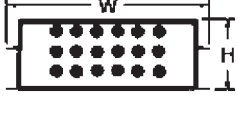
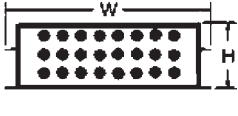
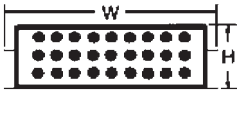
**Common Cable Bus Systems 5 kV • Yaygın Cable Bus Sistemleri 5 kV**

TYPICAL CROSS SECTION	SYSTEM AMPACITY	HEIGHT (H)	WIDTH (W)	# OF CONDUCTORS PER PHASE
	800A	6"	15 1/2"	1-750 MCM
	1200A	8"	15 1/2"	2-500 MCM
	1600A	8"	15 1/2"	2-750 MCM
	2000A	8"	21 1/2"	3-500 MCM
	2500A	8"	21 1/2"	4-500 MCM
	3000A	8"	27 1/2"	4-750 MCM
	4000A	12"	27 1/2"	6-750 MCM
	5000A	12"	30 1/2"	7-750 MCM
	6000A	12"	32 1/2"	8-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For CSA equivalent data please contact the factory.
- For additional amperage and voltage requirements please contact the factory.

- Yukarıda sistemler 3P topraklamasız sistemleri gösterir
- Sistemler topraklamalı ya da topraklamasız tamamı, yarısı yada bazı bölümleri 3P + N olarak üretilebilir.
- Aynı taşıyıcı içindeki devreleri birleştirmek mümkündür.
- CSA'ya eşdeğer veriler için lütfen satış temsilcinizle temasa geçin.
- İlave amper ve voltaj gereksinimleri için lütfen satıcınızla temasa geçin.

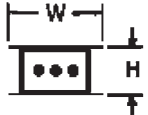
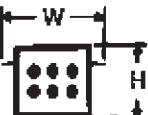

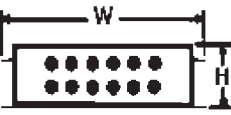
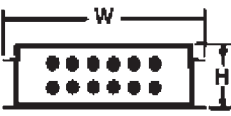
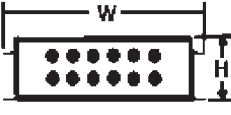
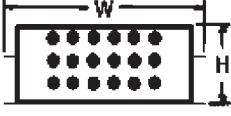
## Common Cable Bus Systems 15 kV • Yaygın Cable Bus Sistemleri 15 kV

TYPICAL CROSS SECTION	SYSTEM AMPACITY	HEIGHT (H)	WIDTH (W)	# OF CONDUCTORS PER PHASE
	800A	6"	15 1/2"	1-750 MCM
	1200A	8"	15 1/2"	2-500 MCM
	1600A	10"	15 1/2"	2-750 MCM
	2000A	8"	21 1/2"	3-500 MCM
	2500A	8"	27 1/2"	4-500 MCM
	3000A	10"	27 1/2"	4-750 MCM
	4000A	12"	27 1/2"	6-750 MCM
	5000A	12"	32 1/2"	7-750 MCM
	6000A	12"	35 1/2"	8-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For CSA equivalent data please contact the factory.
- For additional amperage and voltage requirements please contact the factory.

- Yukarıda sistemler 3P topraklamasız sistemleri gösterir
- Sistemler topraklamalı ya da topraklamasız tamamı, yarısı yada bazı bölümleri 3P +N olarak üretilebilir.
- Aynı taşıyıcı içindeki devreleri birleştirmek mümkündür.
- CSA'ya eşdeğer veriler için lütfen satış temsilcinizle temasa geçin.
- İlave amper ve voltaj gereksinimleri için lütfen satıcınızla temasa geçin.

**Common Cable Bus Systems 35 kV • Yaygın Cable Bus Sistemleri 35 kV**

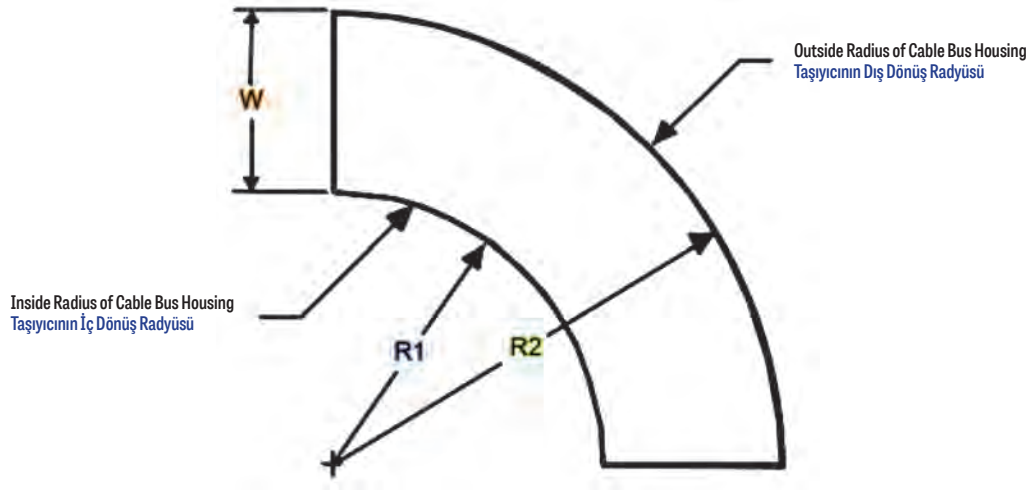
TYPICAL CROSS SECTION	SYSTEM AMPACITY	HEIGHT (H)	WIDTH (W)	# OF CONDUCTORS PER PHASE
	800A	6"	15 1/2"	1-750 MCM
	1200A	10"	15 1/2"	2-500 MCM
	1600A	10"	15 1/2"	2-750 MCM
	2000A	10"	27 1/2"	4-500 MCM
	2500A	10"	27 1/2"	4-500 MCM
	3000A	10"	27 1/2"	4-750 MCM
	4000A	14"	27 1/2"	6-750 MCM

- Systems shown are 3 Phase / 3 Wire without system ground.
- Systems can be 3 Phase / 4 Wire with full, half, or partial neutral with or without a system ground.
- Combining circuits within the same enclosure is available.
- For CSA equivalent data please contact the factory.
- For additional amperage and voltage requirements please contact the factory.

- Yukarıda sistemler 3P topraklamasız sistemleri gösterir
- Sistemler topraklamalı ya da topraklamasız tamamı, yarısı yada bazı bölümleri 3P + N olarak üretilebilir.
- Aynı taşıyıcı içindeki devreleri birleştirmek mümkündür.
- CSA'ya eşdeğer veriler için lütfen satış temsilcinizle temasa geçin.
- İlave amper ve voltaj gereksinimleri için lütfen satıcınızla temasa geçin.

## System Cross Sections & Dimensions

### 90° Horizontal Radius Fitting



Industry exclusive tangents available for faster, easier installation.

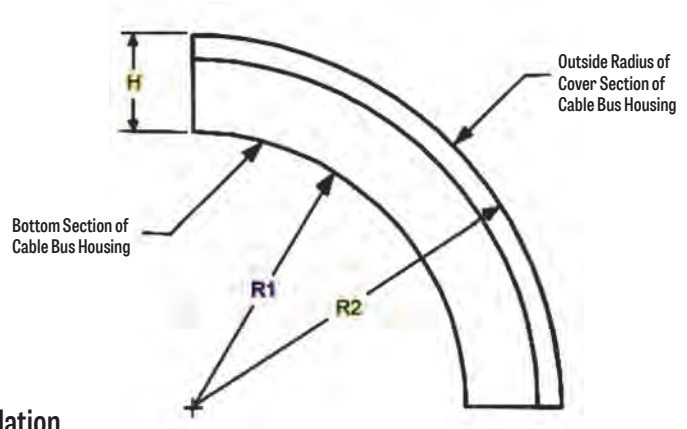
Nominal Radius	Cable Bus Width "W"	Inside Radius "R1"	Outside Radius "R2"
12"	9"	12"	21"
	12"	12"	24"
	18"	12"	30"
	24"	12"	36"
18"	9"	18"	27"
	12"	18"	30"
	18"	18"	36"
	24"	18"	42"
24"	9"	24"	33"
	12"	24"	36"
	18"	24"	42"
	24"	24"	48"

\*Radii shown are to outside flange. Cable radius will be nominal radius or greater.



## System Cross Sections & Dimensions

### 90° Vertical Outside Radius Fitting



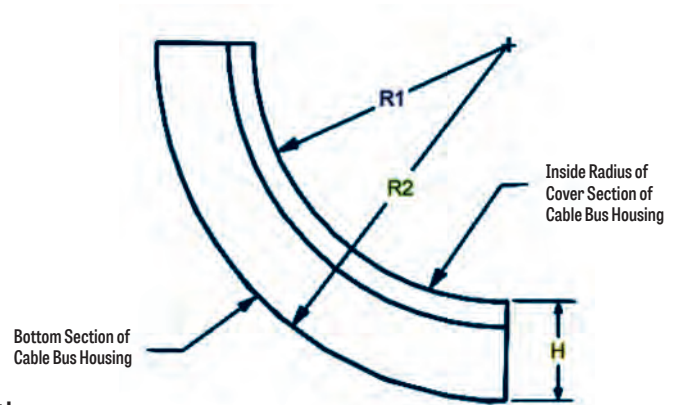
Industry exclusive tangents available for faster, easier installation.

Nominal Radius	Cable Bus Height "H"	Inside Radius "R1"	Outside Radius "R2"
12"	6"	11-¾"	17-¾"
	8"	11-¾"	19-¾"
	10"	11-¾"	21-¾"
	12"	11-¾"	23-¾"
18"	6"	18"	24"
	8"	18"	26"
	10"	18"	28"
	12"	18"	30"
24"	6"	22-½"	28-½"
	8"	22-½"	30-½"
	10"	22-½"	32-½"
	12"	22-½"	34-½"

\*Cable radius will be greater than nominal radius.

## System Cross Sections & Dimensions

### 90° Vertical Inside Radius Fitting

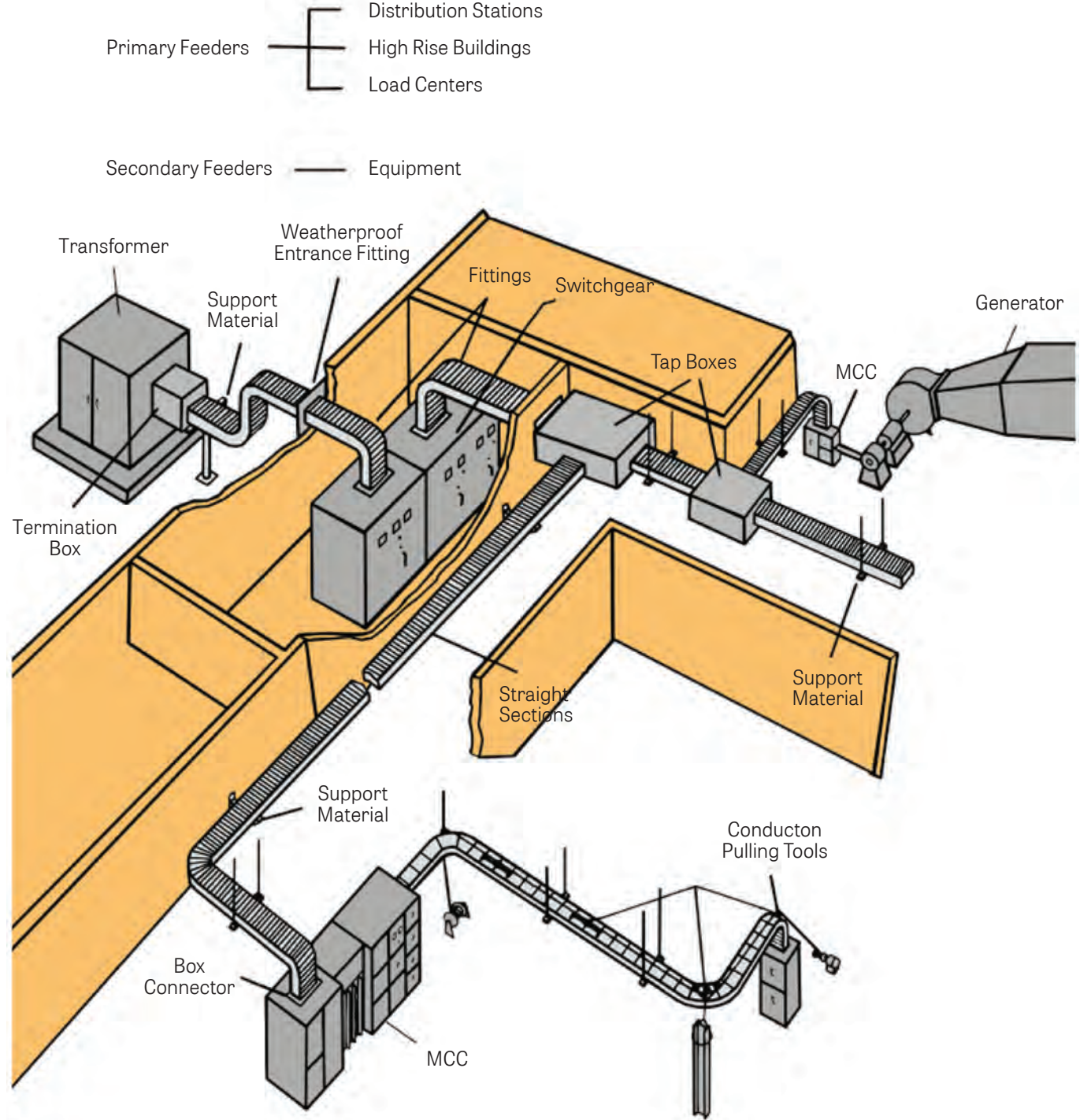


Industry exclusive tangents available for faster, easier installation.

Nominal Radius	Cable Bus Height "H"	Inside Radius "R1"	Outside Radius "R2"
12"	6"	11-¾"	17-¾"
	8"	9-¾"	17-¾"
	10"	7-¾"	17-¾"
	12"	5-¾"	17-¾"
18"	6"	18"	24"
	8"	16"	24"
	10"	14"	24"
	12"	12"	24"
24"	6"	22-½"	28-½"
	8"	20-½"	28-½"
	10"	18-½"	28-½"
	12"	16-½"	28-½"

\*Cable radius will be greater than nominal radius.

## Cable Bus System Layout • Kablo Yolu Sisteminin Düzenlenmesi



## System Components

### Termination Boxes

Transformer Termination Boxes, Switchgear/MCC Top Hats and other junction boxes designed and supplied by MP Husky guarantee the needed space to properly transpose the phases and terminate the conductors to the electrical equipment. Standard termination boxes are aluminum welded angle frame construction with bolted removable side panels and welded fixed panels as needed. Painted steel and stainless steel are also available. Outdoor boxes are NEMA 4X and use gasketed removable panels, fully seam welded fixed panels, and an ESF type seal to ensure a water-tight enclosure.

### Box Connectors

Box connectors are used to connect the Cable Bus Housing to indoor electrical equipment for entry into switchgear, MCC's, etc.

### Tap Boxes

Tap boxes allow for intermediate load tapping. The design provides system voltage rated air separation between live parts and adjacent surfaces to eliminate the necessity of tapping all energized components. The tap box consists of:

- Aluminum framed enclosure
- Removable covers (gasketed for outdoor applications)
- Porcelain or Epoxy post stand off insulators
- Plated Bus bars

### Watertight Seals (Environmental Seal Flange -ESF)

These fittings form a seal with walls and can also be used for floor penetrations that must be watertight. Conductors are sealed with RTV silicone sealant. Entrance fittings are furnished with all necessary hardware.

### MCT Firestop / Watertight Seal

MCT seals are used when a fire rated and watertight seal is required. Neoprene modules are inserted after the cables are installed for ease of pulling. They are UL listed for a 2 hour fire rating and come with all necessary hardware.

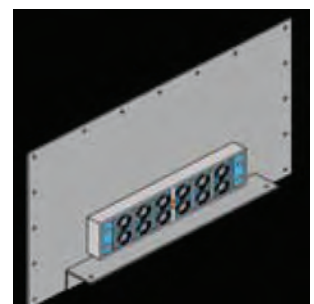
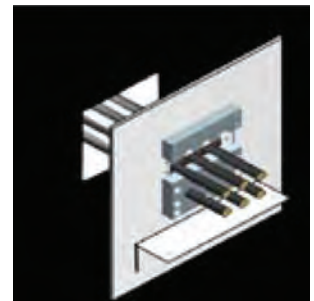
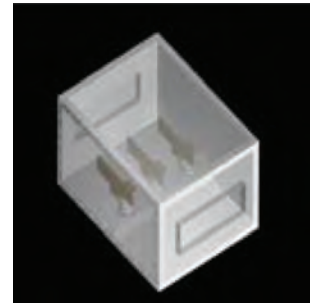
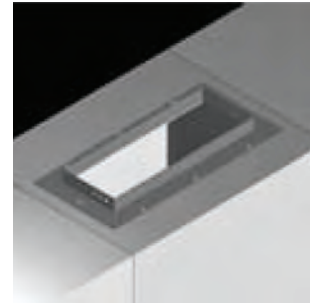
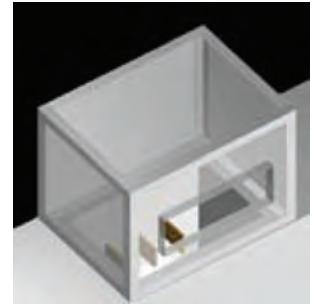
### Electrical Connectors

Two Hole Long Barrel Compression type lugs and Silicon bronzed termination hardware are supplied with each project to ensure a long lasting, reliable connection with electrical equipment.

### Cable Termination Kits

Heat or Cold Shrink Termination materials are supplied for all medium voltage Cable Bus Systems and are rated for both indoor and outdoor use.

MP Husky is the only Cable Bus System certified to CSA C22.2 #27 (Busways) and C22.2 #201.



## Sistem Montaj Parçaları

### Bağlantı Kutuları

Trafo bağlantı kutuları, Hücre/Anadağıtım panolar şapkaları ı ve diğer bağlantı kutuları MP Husky tarafından fazların geçişi, kabloların ekipmanlara bağlantısı için gerekli boşlukları sağlayacak şekilde tasarlanır. Standart bağlantı kutuları, alüminyum cıvatalı çıkarılabilir yan paneller ile kaynaklı köşebentten çerçeveden oluşur ve gerektiğinde kaynakla sabitlenir. Botalı çelik ve paslanmaz çelik olarak da üretilebilir. Harici tip kutular NEMA 4X'tir ve su sızdırmazlık sağlamak için contalı sökülebilir paneller, tamamen dikiş kaynaklı sabit paneller ve ESF tipi bir conta kullanılmaktadır.

### Kutu Bağlantıları

Kutu bağlantıları, kablo taşıyıcı gövdeyi şalter, pano vb. iç mekan elektrik ekipmanlarına bağlamak için kullanılır.

### Bağlantı Kutuları

Bağlantı kutuları yük ayırmak için kullanılır. Kutuların tasarımı, yük altındaki ve bunlara yakın ekipmalara teması hava yoluyla engelleyecek şekildedir. Bağlantı kutusu aşağıdaki parçalardan oluşur:

- Alüminyum köşenet çerçeve
- Çıkarılabilir Kapaklar(Harici ortam için contalı)
- Porselen ya da Epoxy izolatorler
- Kaplamalı Bara

### Susuzdirmaz conta

Bu bağlantı parçaları duvar geçişlerinde sıvı sızdırmazlık oluşturur ve sıvı sızdırmaz bağlantı gerektiğinde zemin bağlantılarında da kullanılabilir.İletkenler RTV silikon izolasyon maddesi ile kapatılmıştır. Giriş bağlantıları gerekli tüm hırdavatlarla donatılmıştır.

### Çoklu Kablo Geçişi (Multi Cable Transit) Alev Durdurucu/Susuzdirmaz

MCT Conta, kablo geçişlerinde alev ve su sızdırmazlık gerekli olduğunda kullanılır.Neoprene modüller kablo çekmeyi kolaylaştırmak için sonradan takılır. İki saat yangına dayanım için UL sertifikası vardır ve tüm montaj aksesuarları ile sevk edilir.

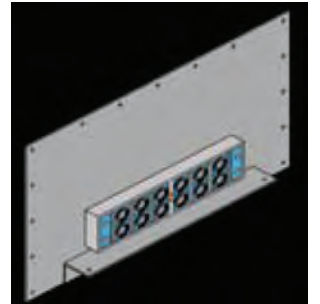
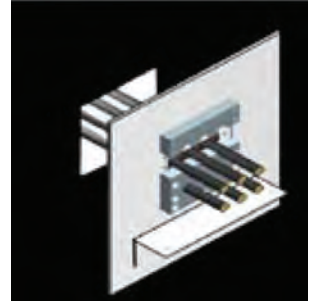
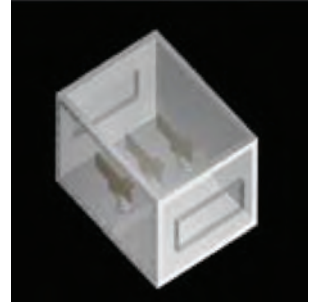
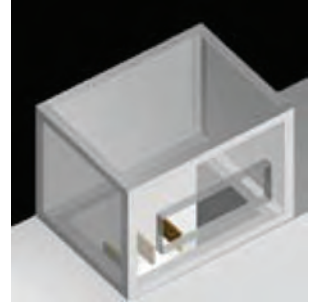
### Elektrik Bağlantıları

Ekipmalara bağlantının sağlam ve uzun ömürlü olmasını garantilemek için iki delikli silicon kaplı bronz kablo pabuçları montaj ekipmanları ile her projeye uygun sevk edilir.

### Kablo Bağlantıları

Cable sistemindeki tüm orta gerilim kablolarının ekleri için harici ve dahil tip ısıyla ya da soğuk daralan ek mufları sitemle birlikte sevk edilir.

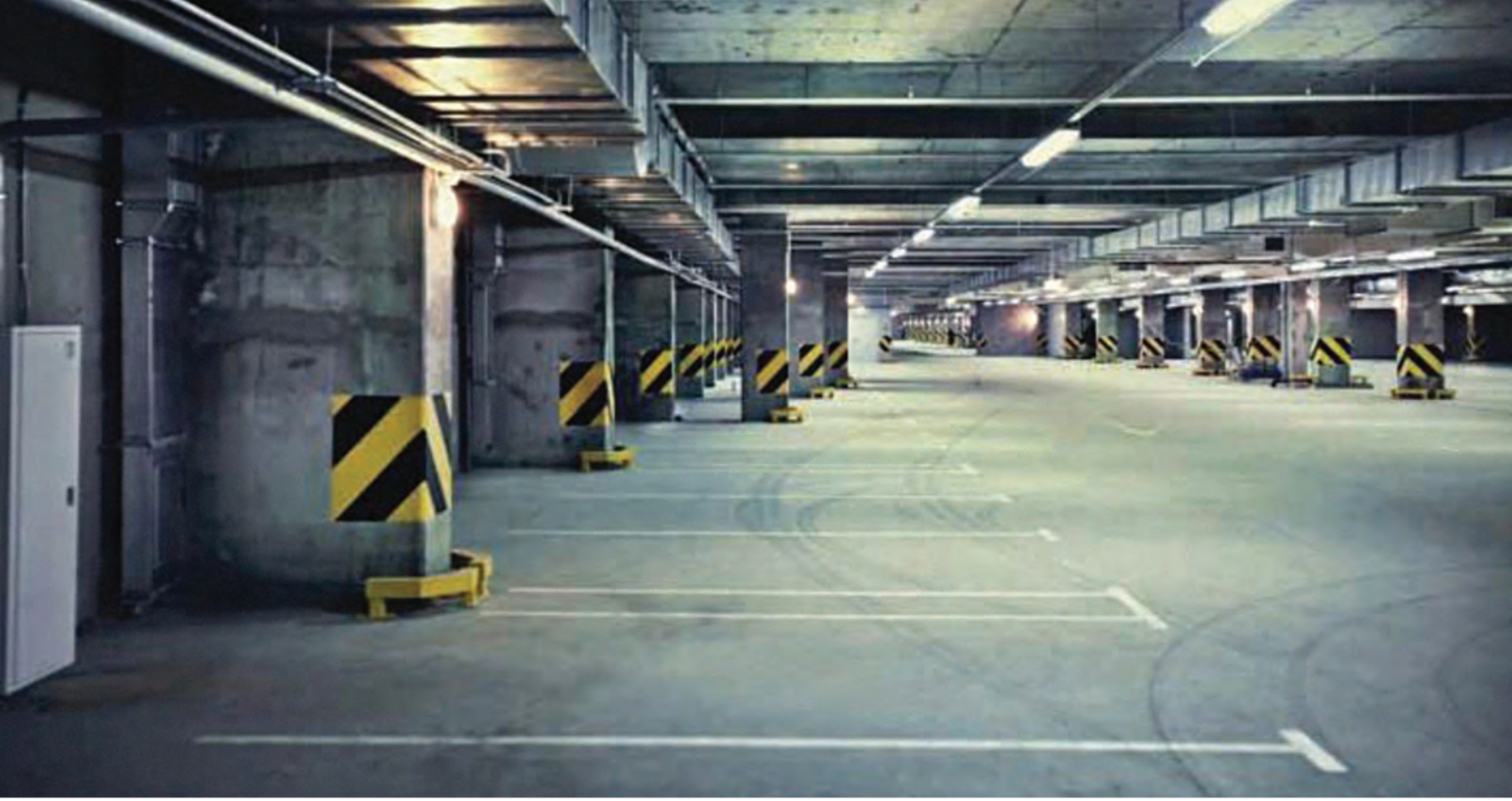
MP Husky is the only Cable Bus System certified to CSA C22.2 #27 (Busways) and C22.2 #201.





# NELSON HEAT TRACE

**SIMPLE, SAFE FREEZE PROTECTION**  
**BUZLANMAYA KARŞI BASİT ve**  
**GÜVENLİ KORUMA**



**SELF-REGULATING HEATING CABLES**  
**KENDİNDEN REGÜLELİ ISI İZLEME KABLOLARI**



## SELF-REGULATING HEATER CABLES KENDİNDEN REGÜLELİ KABLOLAR

Nelson provides self-regulating heating cables for both freeze protection and process maintenance applications. Our cables are tested and certified to ensure the highest quality even in the harshest of environments. These heater cables can be field cut-to-length and feature multiple power output and voltage ratings.

- 120 thru 277 volt ratings
- 3 thru 20 watts per foot power outputs
- Various configurations available
- Maintenance temperatures up to +121 °C (+250°F)
- Lower energy consumption
- Certified for ordinary, Division and Zone hazardous locations



## MINERAL INSULATED HEATERS MİNERAL İZOLELİ KABLOLAR

Nelson pioneered the use of mineral insulated heating cables for industrial applications that require higher temperatures, extended heater life and efficient power output. With one or two heating elements surrounded by magnesium oxide insulation, maximum exposure temperatures of +593 °C (+1,100°F) are possible. Wrapped in a corrosion-resistant alloy 825 sheath, MI heating cables feature excellent chemical resistance, including immunity from harsh chloride stress corrosion. Nelson's unique manufacturing process results in a product that is superior in durability, flexibility, and ease of installation.

- Voltages up to 600 Vac
- Power outputs to 70 watts per foot
- Maintenance temperatures up to +371 °C (+700°F)
- Uniform diameters of 4.8 mm and 7.9 mm (.19 in and .31 in)
- Highly flexible, easy to install
- Certified for ordinary, Division and Zone hazardous locations



## TERMINATION KITS SONLANDIRMA KİTLERİ

Nelson can provide a wide range of connection systems to meet the global installation requirements for Zone and Division locations. Manufactured using the highest quality materials, these systems are designed to handle the wide temperature ranges and chemical exposures found in today's industrial facilities. Pipe mounted and component based connections meet the stringent demands for heat trace applications.

- Power, splice and tee splice connections
- Above the insulation end terminations for accessibility
- Optional end of circuit indicating lights use LED lamps for reliability and long life
- Complete line of installation accessories
- Certified for ordinary, Division and Zone hazardous locations

### CM-2201 SINGLE POINT CONTROL/MONITORING SYSTEM



For stand-alone or networked heat tracing applications, the CM-2201 is Nelson's most versatile control and monitoring system. This microprocessor based controller allows operational personnel to control the line temperature, as well as monitor various conditions such as voltage and current alarms, ground fault leakage and trip conditions, and sensor and communication failures. The CM-2201 is housed in a NEMA 4X enclosure that is certified for ordinary, Division and Zone locations. Simple integration into existing systems is assured with the ability to connect 256 individual systems per node and compatibility to Nelson's CM.COMM software or any Modbus compatible device.

- User selectable control modes
- Easy to read display for quick and clear communications
- Dual RTD inputs with user selectable operations
- Programmable auto test feature
- For use in hazardous and ordinary locations

### CM-332 MULTI-POINT CONTROL/MONITORING SYSTEM



One of the most advanced control and monitoring systems available, the CM-332 is a microprocessor based control and monitoring system based on standard industrial automation products specifically integrated for use with electric heat tracing systems. Nelson's CM-332 system provides temperature and current monitoring for each heat tracing circuit while communicating additional information to operations personnel such as temperature alarms, circuit faults, and sensor failure and communications failures.

- Color touchscreen operator interface
- Compatibility with existing facility automation systems
- Complete temperature monitoring
- Complete heater cable monitoring
- Configurable circuit management alerts
- Configurable system trouble alarms
- Global programming of all control and alarm functions
- Programmable auto test feature
- Worldwide product support
- Certified for ordinary and Division 2 hazardous locations
- Ethernet and Modbus communication options available



## Ordinary Locations • Tehlikeli Olmayan Bölgeler

Please refer to marking on respective product.

Ürün üzerinde onaylar belirtilmiştir.

## Hazardous Locations • Tehlikeli Bölge Onayları

Compliance with Safety Requirements has been assured by compliance with:

NEC® 2005; NFPA 70: National Electrical Code®, International Electrical Code Series  
IEEE Std 515™-2004 Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications  
IEEE Std 515.1™-2005 Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications

UL		
Certificate No.	Coding	
LT:	E49805	Class I, Division 2, Group ABCD. Class II, Division 2, Group FG. Class III, Division 2. Class I, Zone 1 and 2, Group IIC
QLT:	E49805	Class I, Division 2, Group ABCD. Class II, Division 2, Group FG. Class III, Division 2. Class I, Zone 1 and 2, Group IIC
HLT:	E49805	Class I, Division 2, Group ABCD. Class II, Division 2, Group FG. Class III, Division 2. Class I, Zone 1 and 2, Group IIC
D1-LT:	E49805	Class I, Division 1, Group BCD. Class II, Division 1 Group EFG. Class III
D1-HLT:	E49805	Class I, Division 1, Group BCD. Class II, Division 1 Group EFG. Class III

FM		
Certificate No.	Coding	
LT:	AM2A4.AF	Class I, Division 2, Group BCD Class II and III, Division 2, Group G Class I, Zone 1, Group IIC
HLT:	AM2A4.AF	Class I, Division 2, Group BCD Class II and III, Division 2, Group G Class I, Zone 1, Group IIC
D1-LT:	3004655	Class I, Division 1, Group BCD Class I, Zone 1, Group IIB
D1-HLT:	3004655	Class I, Division 1, Group BCD Class I, Zone 1, Group IIB

CSA		
Certificate No.	Coding	
LT:	LR 42104w	Class I, Division 1 and 2, Group BCD Class II, Division 1 and 2, Group EFG Class I, Zone 1 and 2, Group IIB+H2 Zone 1, Ex e II T6 (T5)
HLT:	LR 42104	Class I, Division 1 and 2, Group BCD Class II, Division 1 and 2, Group EFG Class I, Zone 1 and 2, Group IIB+H2 Zone 1, Ex e II T3

ATEX: EN 60079-0:2006, EN 60079-30-1:2007, EN 61241-0:2006, EN 61241-1:2004  
IECEX: IEC 60079-0:2004, IEC 60079-30-1:2007, IEC 61241-0:2004, IEC 61241-1:2004

## KEMA

Certificate No.	Coding
LT: KEMA 07ATEX0124	0344 II 2 G Ex e II T6 (LT3, LT23, LT5, LT25) II 2 D Ex tD A21 T 80°C II 2 G Ex e II T5 (LT8, LT28, LT10, LT210) II 2 D Ex tD A21 T 95°C
QLT: KEMA 07ATEX0124	0344 II 2 G Ex e II T3 II 2 D Ex tD A21 T 195°C
HLT: KEMA 07ATEX0124	0344 II 2 G Ex e II T3 II 2 D Ex tD A21 T 195°C
LLT: KEMA 08ATEX0147U*	0344 II 2 G Ex e II T5 II 2 D Ex tD A21 T 95°C

## IECEX

Certificate No.	Coding
LT: KEM 07.0041	Ex e II T6 (LT3, LT23, LT5, LT25) Ex tD A21 IP66 T 80°C Ex e II T5 (LT8, LT28, LT10, LT210) Ex tD A21 IP66 T 95°C
QLT: KEM 07.0041	Ex e II T3 Ex tD A21 IP66 T 195°C
HLT: KEM 07.0041	Ex e II T3 Ex tD A21 IP66 T 195°C
LLT: KEM 08.0033U*	Ex e II T5 Ex tD A21 T 95°C

\* Connections and terminations for installation with the LLT heating cable series shall be certified according to the requirements of the applicable standards for their types of protection for potential explosive gas and/or combustible dust atmosphere, as well as the requirements of IEC 60079-30-1 as integral parts of this trace heating system.

For more specific details on approvals, please refer to marking on respective product or contact manufacturer.

## Electrical Data

Product	Rated Voltage	Maximum Steady-State Current
LT, QLT, HLT	100V, 110V, 120V	18 Amps
LT2, QLT2, HLT2	200V, 208V, 220V, 230V, 240V, 277V	18 Amps
D1-LT, D1-HLT	100V, 110V, 120V	18 Amps
D1-LT2, D1-HLT2	200V, 208V, 220V, 230V, 240V, 277V	18 Amps
LLT	200V, 208V, 220V, 230V, 240V, 277V	38 Amps

## Specifications:

	LT	QLT	HLT	D1-LT	D1-HLT	LLT
Maximum Maintain Temperature	65°C (150°F)	120°C (250°F)	120°C (250°F)	65°C (150°F)	120°C (250°F)	65°C (150°F)
Maximum Continuous Exposure Temperature (continuous power on)	65°C (150°F)	120°C (250°F)	120°C (250°F)	65°C (150°F)	120°C (250°F)	65°C (150°F)
Maximum Intermittent Exposure Temperature (1000 hours cumulative exposure)	85°C (185°F)	120°C (250°F)	190°C (375°F)	85°C (185°F)	190°C (375°F)	85°C (185°F)
Temperature Classification (Cable wattage if applicable)	T6 (3, 5) T5 (8, 10)	T3	T3	T6 (3, 5) T5 (8, 10)	T3 (3 - 15) T2C (18, 20)	T5
Minimum Installation Temperature	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)	-40°C (-40°F)
Minimum Bend Radius at -40°C (-40°F)	25.0 mm (1.0 in)	25.0 mm (1.0 in)	25.0 mm (1.0 in)	25.0 mm (1.0 in)	25.0 mm (1.0 in)	25.0 mm (1.0 in)

Only Nelson Heat Trace approved termination, connection and splice kits should be used in accordance with manufacturer's installation instructions. Failure to do so will void warranties and agency approvals. For the connection of the heating cable to power, certified enclosures must be used that are suitable for the application and are correctly installed. When connecting to Ex e or other certified terminals using associated accessories, the required creepage distances and clearances shall be observed. Other terminations and connections, not mentioned in this document, that are to be installed as an integral part of the heating cable system, shall be certified according to the requirements of the applicable standards for their types of protection. Installation instructions in each component kit should be followed regarding heater cable preparation and assembly. Make end terminations and splice connections before making the power connections. It is recommended that all heater cables be tagged as they are installed with a discrete circuit number. Proper labeling will facilitate identification, component requirements and electrical wiring during later phases of the installation. Power, splice and tee connection kits utilize adapters for installation on equipment other than piping systems such as instrument tubing and tanks. Installation instructions for proper mounting are included in each kit.

Certification details can be found in the installation instructions of individual accessories, if applicable.

Type	Description	Applicable for
PLT Series	Connection System, non-metallic	LT, QLT, HLT
ALT Series	Connection System, metallic	LT, QLT, HLT
HASK Series	Connection System, Division 1 only	D1-LT, D1-HLT
Z1-PLT Series	Connection System, Zone 1, non-metallic	LT, QLT, HLT
Z1-ALT Series	Connection System, Zone 1, metallic	LT, QLT, HLT
AX Series	Connection System, NEC Wiring Methods	LT, QLT, HLT
EX Series	Connection System, IEC Wiring Methods	LT, QLT, HLT
HEC100	Connection System, end termination	LT, QLT, HLT
HEL100	Connection System, lighted end termination	LT, QLT, HLT
HPC, HSC, HTC	Connection System, termination components	LT, QLT, HLT
LT-ME, LT-MP	Cable Seal Kit	LT, QLT, HLT
LT-SE, LT-SP	Cable Seal Kit, shrink tubing	LT
LT-HSE, LT-HSP	Cable Seal Kit, shrink tubing	HLT
LT-SS, HSK-85	Splice Connections, shrink tubing	LT
LT-HSS	Splice Connections, shrink tubing	HLT
HPS, HES	Cable Seal Kit	LT, QLT, HLT
GH-M25	Heater Cable Gland	LT, QLT, HLT
HCSK	Heater Cable Sealing Kit	LT, QLT, HLT
GHK-M25	Termination Kit	LT, QLT, HLT

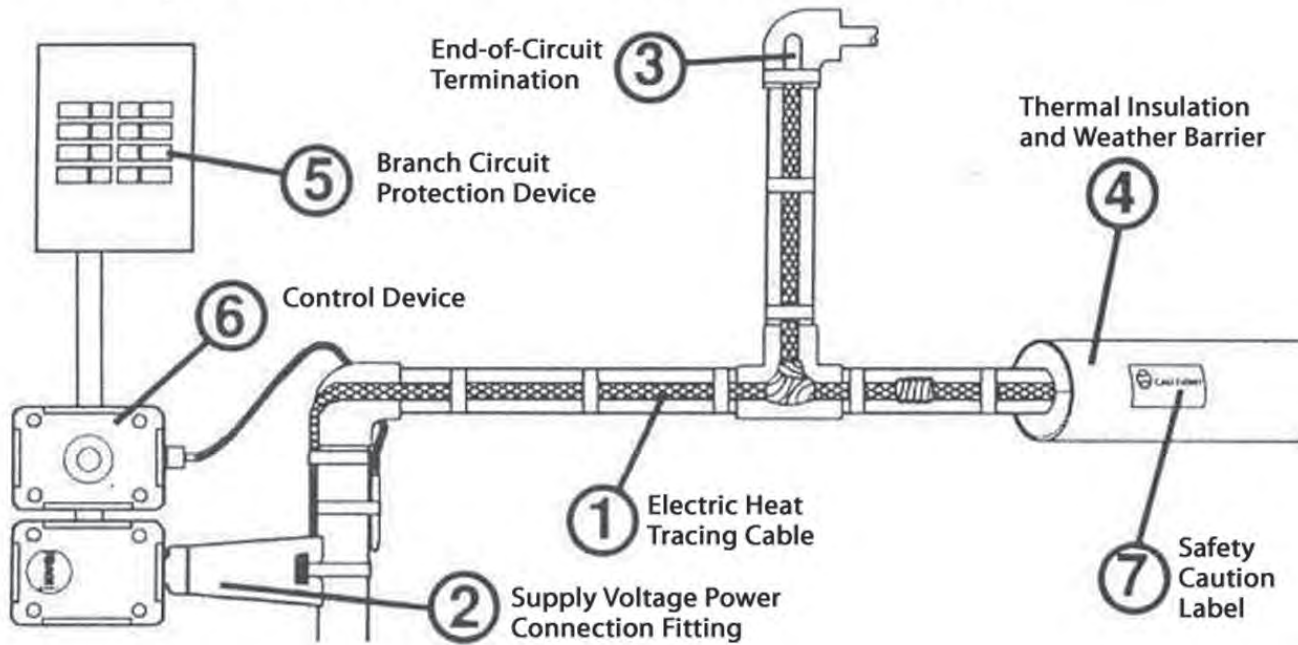
Refer to Figure 1 for common examples of heating cable and accessories installation for a standard piping application.



## A WARNING:

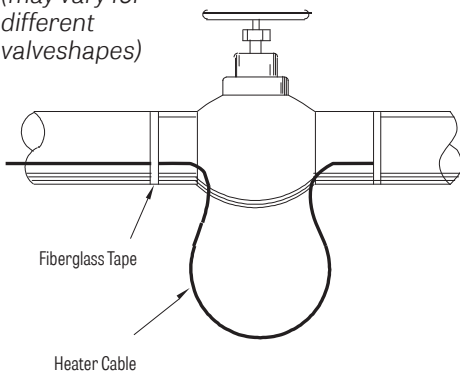
Connecting bus wires together  
will create an electrical short.

### Typical Electric Heat Tracing System for Industrial Processes



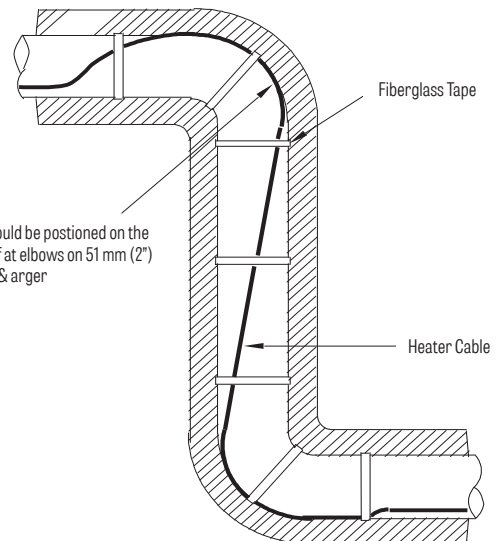
#### Valve

Typical installation method  
(may vary for  
different  
valve shapes)

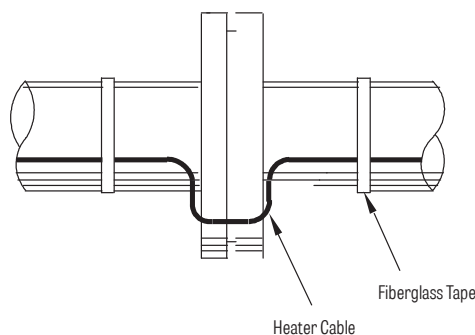


#### Elbow

Heater cable should be positioned on the  
outside radius of at elbows on 51 mm (2")  
diameter pipes & larger



#### Flange





  
**EMERSON**

**SOLA****HD**







## ENSURING CLEAN POWER QUALITY THROUGHOUT YOUR FACILITY • TESİSİN HER YERİNDE KESİNTİSİZ, DÜZENLİ ENERJİ

Maintaining clean, continuous power is critical to plant safety and production. Power anomalies, such as voltage irregularities, brownouts and blackouts, create equipment failures that lead to costly downtime and compromised safety. They also affect data corruption and loss in both computers and computer controlled equipment. SolaHD manages power anomalies with a full line of power quality solutions.

Kesintisiz ve kaliteli enerji, bir tesisin güvenliği ve üretimi açısından kritik öneme sahiptir. Voltaj bozuklukları, düzensizlikleri ve kesintileri gibi arızalar, yüksek maliyetli kesinti ve güvenlik açısından tehlikeli olan ekipman arızalarını yaratır. Ayrıca hem bilgisayarların hem de bilgisayar kontrollü ekipmanların verilerinin bozulması ve kaybına neden olurlar. SolaHD, enerjide ortaya çıkacak anormallikleri düzenleyen çözümler üretir.

SolaHD's power quality solutions are designed to ensure optimum production performance and workplace safety by protecting, converting and supplying power across your facility. SolaHD's transformers smooth the stream of power entering the plant's service inlet. Our surge suppressors, power conditioners, transformers and power supplies clean and support power throughout the branch distribution. SolaHD's line reactors, power supplies and uninterruptible power supplies (UPS) maintain the right voltage level to keep computer equipment and production lines humming along.

SolaHD equipment also meets the needs of industrial locations with encapsulated power supplies and transformers that surpass NEMA standards, along with a range of products rated for flammable atmospheres.

Depend on SolaHD's power quality solutions for controlled, reliable power throughout your plant. We are there, from service entrance to branch panel to point of use, to protect production with power that is always on and ready to be used.

SolaHD'nin enerji kalitesi çözümleri, tesisiniz boyunca güç koruma, dönüştürme ve tedarik etme yoluyla optimum üretim performansı ve işyeri güvenliğini sağlamak üzere tasarlanmıştır. SolaHD trafoları, şebeke girişindeki gerilimi düzenler. Dalgalanma önleyici, güç düzenleyicileri, trafolar ve güç kaynakları, düzensiz elektrik verilmesini önler. SolaHD'nin hat reaktörleri, güç kaynakları ve kesintisiz güç kaynakları (UPS), bilgisayar ekipmanı ve üretim hatlarının sorunsuz çalışması için doğru voltaj seviyesini korur.

Tesisiniz boyunca kontrollü, güvenilir güç için SolaHD'nin enerji kalitesi çözümlerine güvenebilirsiniz. Şebeke girişinden panolara ve kullanım noktalarına, kesintisiz ve kullanılmaya hazır enerji sağlayarak üretiminize ara vermemeniz için yanınızdayız.



## SDN™ POWER SUPPLY SERIES SDN™ SERİSİ GÜÇ KAYNAKLARI



SolaHD's line of SDN power supplies provides industry leading performance across a wide breadth of applications and uses. These power supplies have been engineered for the demands of hazardous locations with a wide operation temperature range, reliable performance, and high tolerance to shock and vibration. The SDN Series meets the European directive with power factor correction. SolaHD is a member of the Open DeviceNet Vendors Association and has designed certain SDN models for DeviceNet applications.

- Select models are ATEX approved
- Adjustable output voltage
- No internal fan, no extra cooling required in any power level
- Auto select 110/230 Vac, 50/60 Hz Input
- Operating temperatures range from -10°C to +60°C (+14°F to +140°F)
- Powers high inrush loads without shutdown or foldback
- Indefinite short circuit, over voltage and over temperature protection
- DC OK signal
- Highly efficient >90% switching capability

## SCP-X SERIES SCP-X SERİSİ GÜÇ KAYNAKLARI



The SCP-X Series is an enclosed IP 66/67 and NEMA 4X rated power supply for stand alone operations. This series operates within -40°C to +60°C (-40°F to +140°F) without derating and features quick change connectors for fast hook ups. The SCP-X's metal housing also reduces costs over having separate housings.

- Worldwide approvals
- Universal input
- Can be mounted in any orientation without limitation
- DC OK green LED
- ATEX approved

SDN serisi güç kaynakları pano içi ray montajlı kullanım içindir. Tüm ürünler CE sertifikalı olup, belli ürünlerde ATEX sertifikası da bulunmaktadır. -10°C to +60°C çalışma aralığına sahip olup, 110/230, 50/60 Hz. girişlidir. Kısa devre, gerilim ve sıcaklık aşımı korumalıdır.

SCP-X serisi güç kaynakları IP 66/67 ve NEMA 4X muhafazalı olup, istenen yere kendi başına monte edilebilir. Tüm ürünler CE ve ATEX sertifikalıdır. -40°C to +60°C çalışma aralığına sahip olup, 110/230, 50/60 Hz girişlidir.



## ENCAPSULATED TRANSFORMERS TEHLİKELİ BÖLGE ve DIŞ ORTAM TRAFOLARI

SolaHD's encapsulated transformers are available in different configurations for hazardous locations and harsh weather environments. Rugged NEMA 3R enclosures are rated for Class I, Division/ Zone 2 locations. SolaHD's low temperature rise designs incorporate a +220°C (+428°F) insulation system for critical applications that mandate extra overload capacity, power conservation and cooler operating temperatures. Their temperature rise of only +80°C or +115°C (+176°F or +239°F) under full nameplate load produces 13% to 21% less power loss than conventional +150°C (+428°F) rise units which results in lower running costs and increased reliability. Fully enclosed, non-ventilated designs (TENV) are also available.



- Available NEMA 12, 4X and stainless steel enclosures
- Weather shields
- UL-3R enclosure for indoor or outdoor service
- Copper lead wire terminations
- Wall mounting brackets (500 lbs maximum)
- Copper wound, open core and coil designs
- Generously sized wiring compartments

## POWER CONDITIONERS GERİLİM DÜZENLEYİCİLER

Protect sensitive equipment from damage, degradation or misoperation with SolaHD's power conditioners and voltage regulators. The MCR line regulates the power going to sensitive equipment while providing superior noise filtering and surge protection. Dirty power is no longer caused by impulses, swells, sags, brownouts and waveform distortions. MCR's hardwired and portable designs increase the actual Mean Time Before Failure (MTBF) with SolaHD's ferroresonant design. Surge protection is tested to ANSI/IEEE C62.41 Class A and B Waveform: <10 V let through typical.



- Noise attenuation: -120 dB common mode, -60 dB transverse mode
- Harmonic filtering
- Hardwired series acts as a step-up or step-down transformer
- Galvanic isolation provides exceptional circuit protection
- Hardwired or portable for point-of-use protection
- 25 year typical MTBF
- No maintenance required
- ±3% output voltage regulation



**Wire Connectors**  
**Conduit Bending**  
**Conduit Fishing**

**Yüksük Klemensler**  
**Boru Bükme**  
**Sustalar**








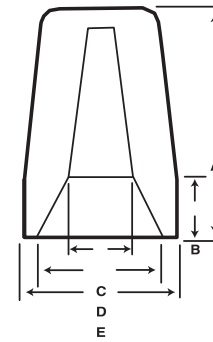
## WireGard™ Color-Coded Screw-On Wire Connectors • WireGard™ Renk Kodlu Yüksük Klemensler

The industry standard twist-on connector with top quality, performance and durability.

- Color-coded for easy size selection.
- Tight, square-wire spring makes quick, secure connections for positive continuity.
- Tough, thermoplastic shell shields against environmental extremes
- Resists chemical action from hydrocarbons, diluted acid or alkaline solutions.
- Flame-retardant properties resist heat distortion up to 105 °C (221 °F).
- High-dielectric shell features deep skirt design to prevent exposure of bare wire
- Copper-to-copper connections only.
- All wire nuts are made with Polypropylene.



	Color	Part #	Pkg Qty	Wire Range	Min	Max
GB-1 (71B)		10-001	100/box	#22 - #16 AWG (connections rated at 300 V Max.)	1 #20 w/1 #22	2 #16
		12-001	25,000/bulk keg			
		12-001BU	150,000/bulk barrel			
		16-001	150/jar			
		19-001	14/card			
		25-001	25/resealable bag			
GB-2 (72B)		10-002	100/box	#22 - #16 AWG (connections rated at 300 V Max.)	3 #22	3 #16
		12-002	10,000/bulk keg			
		12-002BU	96,000/bulk barrel			
		16-002	150/jar			
		19-002	14/card			
		25-002	25/resealable bag			
GB-3 (73B)		10-003	100/box	#22 - #14 AWG (connections rated at 300 V Max. and 600 V Max.) <sup>2</sup>	3 #20	4 #16 w/1 #20
		12-003BU	53,000/bulk barrel			
		13-003	500/bag			
		16-003	100/jar			
		16-003M	300/jar			
		17-003	50/bag			
GB-4 (74B)		10-004	100/box	#18 - #10 AWG (connections rated at 300 V Max. and 600 V Max.) <sup>2</sup>	1 #14 w/1 #18	3 #12
		12-004BU	32,400/bulk barrel			
		13-004	500/bag			
		16-004	200/jar			
		17-004	50/bag			
		19-004	9/card			
GB-6 (76B)		10-006	100/box	#18 - #10 AWG (connections rated at 300 V Max. and 600 V Max.) <sup>2</sup>	2 #14	2 #10 w/2 #12
		12-006BU	21,000/bulk barrel			
		13-006	250/bag			
		16-006	125/jar			
		17-006	50/bag			
		19-006	6/card			
		25-006	25/resealable bag			



### Dimensions

	A	B	C	D	E
GB-1	37/64"	11/64"	1/8"	1/4"	21/64"
GB-2	45/64"	11/64"	3/16"	5/16"	25/64"
GB-3	27/32"	21/64"	13/64"	11/32"	7/16"
GB-4	15/16"	17/64"	15/64"	7/16"	35/64"
GB-6	1 1/16"	17/64"	21/64"	17/32"	21/32"

<sup>2</sup> Note: Connection rated at 600 V Max. for building wiring and rated at 1000 V Max. in lighting fixtures/luminaries and signs. See carton for detailed wire combination ratings or [www.gardnerbender.com](http://www.gardnerbender.com).

### Assortments

Part #	Pkg Qty	Description
19-AWC	9/card	2 gray, 2 orange, 3 yellow, 3 red
25-AWC	25/resealable bag	3 gray, 4 blue, 6 orange, 6 yellow, 6 red

## Hi-Temp Black Connectors for Tough Environments • Hi-Temp Etanj Ortamlar İçin Siyah Yüksük Klemens

Connectors manufactured with high-temperature-rated plastic to withstand extreme temperatures.

- Temperature-rated to 150 °C (302 °F).
- Available in two standard models.
- Copper-to-copper connections only.

Model	(Size)	Part #	Pkg Qty	Wire Range	Min	Max
GB-3	(73B)	10-003HT	100/box	#22 - #14 AWG <sup>1</sup>	3 #20	4 #16 w/1 #20
		27-003	10,000/bulk keg			
GB-4	(74B)	10-004HT	100/box	#18 - #10 AWG <sup>1</sup>	1 #14 w/1 #18	4 #14
		27-004	10,000/bulk keg			

<sup>1</sup> Connections rated at 300 V Max. and 600 V Max.

Note: Connection rated at 600 V Max. for building wiring and rated at 1000 V Max. in lighting fixtures/luminaries and signs. See carton for detailed wire combination ratings or [www.gardnerbender.com](http://www.gardnerbender.com).



GB-4

GB-3

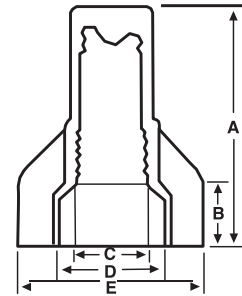
## WingGard® Color-Coded Twist-On Wire Connectors • WingGard® Renk Kodlu Kanatlı Yüksük Klemensler

Unsurpassed quality and durability in a high-leverage, easy-on wing-type design.

- Wings are knurled for a sure grip and offset from centerline for greater twisting leverage.
- Square-wire plated spring instantly adjusts to the shape and size of the splice.
- Flame-retardant properties resist heat distortion up to 105 °C (221 °F).
- High-dielectric shell features deep skirt design to prevent exposure of bare wire.
- Copper-to-copper connections only.

	Color	Part #	Pkg Qty	Wire Range	Min	Max
#84™		10-084	100/box	#22 - #10 AWG (connections rated at 300 V Max. and 600 V Max.)	2 #22	3 #12
		12-084BU	42,000/bulk barrel			
		13-084	500/bag			
		16-084	100/jar			
		16-084M	225/jar			
		17-084	50/bag			
		19-084	6/card			
		25-084	25/resealable bag			
#86™		10-086	100/box	#22 - #6 AWG (connections rated at 300 V Max. and 600 V Max.)	2 #20	4 #10
		12-086BU	22,500/bulk barrel			
		13-086	500/bag			
		16-086	125/jar			
		16-086L	325/jar			
		17-086	50/bag			
		19-086	6/card			
		25-086	25/resealable bag			
#89™		10-089	50/box	#14 - #6 AWG (connections rated at 300 V Max. and 600 V Max.)	1 #10 w/1 #12	1 #6 Str w/2 #8 Str
		13-089	100/bag			
		19-089	2/card			
		25-089	10/resealable bag			

Note: Connection rated at 600 V Max. for building wiring and rated at 1000 V Max. in lighting fixtures/luminaries and signs. See carton for detailed wire combination ratings or [www.gardnerbender.com](http://www.gardnerbender.com).



### Dimensions

	A	B	C	D	E
#84™	1 1/32"	5/16"	7/32"	1/4"	23/32"
#86™	1 1/4"	5/16"	9/32"	7/16"	29/32"
#89™	1 1/2"	7/16"	3/8"	3/4"	1 1/4"

### Assortments

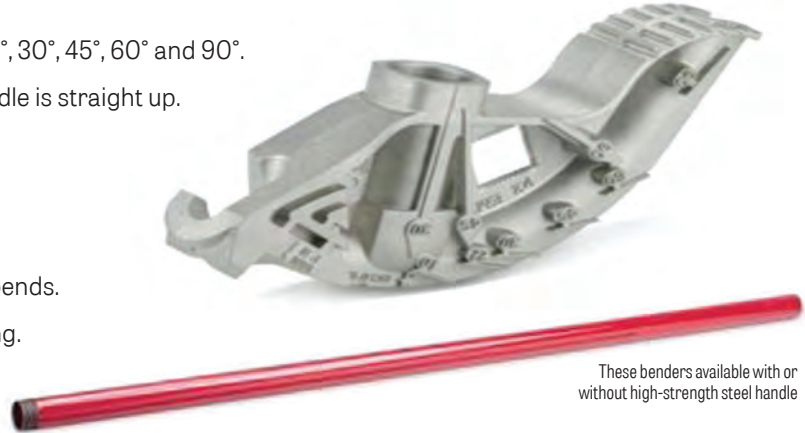
Part #	Pkg Qty	Description
16-8486M	160/jar	80 red, 80 yellow
19-AWW	5/card	2 yellow, 2 red, 1 large gray
25-AWW	25/resealable bag	8 yellow, 8 red, 7 tan, 2 blue



## Big Ben® Conduit Hand Bender • Big Ben® Boru Bükme Aparatı

GB's new series of Big Ben® aluminum hand benders has improved traditional hand benders by enlarging the hook, increasing the foot pedal size and clearance, highlighting the markings and incorporating a dual sight-line system for bending on the floor or in the air. GB's new Big Ben® series offers industry standard markings to simplify the contractor's job. Made of rugged, heat-treated aluminum, the Big Ben® series is backed by a lifetime warranty and is available in the most common sizes of ½", ¾" and 1".

- All models include embossed sight lines for 10°, 22°, 30°, 45°, 60° and 90°.
- Industry-standard markings- 30° bend when handle is straight up.
- Bigger hook with a 5x durability factor.
- Bigger foot pedal- 40% larger.
- More foot room allows for a booted foot.
- Bend-back channel easily corrects conduit over-bends.
- Vise-Mate™ holds conduit while cutting or reaming.



These benders available with or without high-strength steel handle

Part Number	960	960H	961	961H	962	962H
Description	Head Only	Head & Handle	Head Only	Head & Handle	Head Only	Head & Handle
Application	½" EMT		¾" EMT – ½" Rigid		1" EMT – ¾" Rigid	
Fits Handle #	BH-75	Included	BH-75	Included	BH-100	Included
Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Weight	1.34 lbs	5.06 lbs	1.58 lbs	5.34 lbs	3.16 lbs	7.01 lbs
Bend Radius	3.69"	3.69"	4.74"	4.74"	5.81"	5.81"
EMT Size	½"	½"	¾"	¾"	1"	1"
Rigid Size	—	—	½"	½"	¾"	¾"



**Industry Standard Style**  
30° bend when handle is straight up



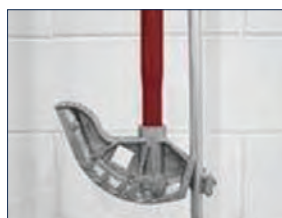
**Bigger Hook**  
With a 5x durability factor



**Bigger Foot Pedal**  
40% larger



**More Foot Room**  
Allows for a booted foot



**Vise-Mate™**  
Holds conduit while cutting or reaming



**Bend-Back Channel**  
Easily corrects conduit over-bends

UpperHand™ Fish Tape • UpperHand™ Susta

GB's series of UpperHand™ fish tapes has improved traditional hand fishing with the first ergonomic fish tape in the industry. The improved design is manufactured with impact-resistant ABS and nylon resins and includes a full, wrap-around interior ring to increase durability. The UpperHand™ series is backed by an industry leading 5-year limited warranty.

- Exclusive **Ergonomic Handle** reduces wrist strain.
- Exclusive **Comfort Formed Grip** reduces forearm strain.
- Exclusive cushioned **Rubber Hand Grips** for ease of operation and comfort (certain models).
- **Impact Modified Handle** and **Housing** that exceeds the 25 ft drop-test.
- Plated Steel Wire resists corrosion (certain models).



A Tape for Every Job



Standard Carbon Steel

Tried-and-true, tough and economical solution for wire pulling.







Corrosion-Resistant Plated Carbon Steel (R series)

The toughest, most durable tape for long-lasting use.



Non-Conductive Fiberglass Core with Nylon Jacket

Exclusive non-conductive tip and unique flat shape is easier to feed yet able to pull up to 500 lbs.

				
	FTN-100R	FTS-65R	FTS-125R	FTS-250R
Tape Length	100'	65'	125'	250'
Tape Material	Fiberglass Core w / Nylon Jacket	Corrosion-Resistant Plated Carbon Steel		
Pkg Qty	1/card	1/card	1/card	1/card
Handle / Housing Material	Nylon / ABS w / rubber grips	Nylon / ABS w / rubber grips	Nylon / ABS w / rubber grips	Nylon / ABS w / rubber grips
Tape Dimensions	1/8" W	1/8" W	1/8" W	1/8" W
Weight	2.99 lbs	3.0 lbs	5.2 lbs	8.2 lbs
Internal / External Ring Dia.	5 1/2" / 12"	4" / 8 1/2"	5 1/2" / 12"	5 1/2" / 12"



Ergonomic Handle

Reduces fatigue and wrist strain by allowing the user to keep their wrist in a natural position

# American **Polywater**<sup>®</sup> Corporation



**ADHESIVES • CLEANERS  
LUBRICANTS • SEALANTS**

**YAPIŖTIRICILAR • TEMİZLEYİCİLER  
KABLO SABUNLARI • MASTİKLER**



## FST™ Foam Sealant • FST™ Mastik

### TECHNICAL DATA SHEET

#### Description

FST™ Sealant is a two-part, high-expansion foam duct sealant. It keeps water, acids, dust, gases, insects, and rodents out of the duct. FST™ Sealant expands and hardens to a "closed cell," rigid structure. This permanent, but removable, seal blocks both water and gas under moderate pressure.

FST™ Sealant comes in a multi-use, single-plunger caulking tube package. The foam wets and adheres to metals, plastics, and concrete, and can seal ducts of different sizes, base materials, and shapes. It will conform around complex cable fill configurations. A kit contains everything required to install the duct block (application tool available separately).

#### Water Blockage

FST™ Sealant is an excellent water block. To test water blocking performance, it is installed into a conduit according to standard procedures, forming a 3-inch plug. Water is added to the system and then pressurized to create a "water head."

Condition	Result
HDPE Duct, (SDR 13.5) No Cables	Holds 7 days at 30 psi (70 feet of water)
PVC Conduit, No Cables	Holds 450 days at 10 psi (22 feet of water)
PVC Conduit, 3 MDPE Cables	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables <b>bent</b> 45°, opposite directions for 5 minutes	Holds 15 min at 40 psi (90 feet of water)
PVC Conduit, 3 MDPE Cables <b>pulled</b> with 15 lbs axial force for 4 hours	Holds 15 min at 40 psi (90 feet of water)

FST™ Sealant blocks considerable water head pressure, even when forces are placed on the cable to stress the seal.



The FST™ Sealant comes in a caulking style (one plunger) tube. Package allows multiple seals. Mixing is done in the nozzle as the sealant is injected.

#### Product Benefits

- Meets 2011 NEC Articles 225.27, 230.8, 300.5(G), and 300.7(A) on Raceway Seals, and 501.15(B)(2)
- Creates a strong, resilient, chemically resistant seal
- Holds 22 feet water head pressure continuous; 70 feet water head intermittent
- Expands, cures, and seals even when water is present
- Controlled injection quantity no waste
- Seal tolerates cable movement and environmental extremes
- Compatible with common cable and wire jackets
- Single cartridge can seal multiple ducts
- Re-enterable seal can be removed
- Complies with TIA-758-B Standard 5.11.2.8, 5.4.2.3 and 7.4.2.8.1

#### Official Approvals

UL Recognized

Passes UL94

Class HBF fire retardant rating



## Model Specification

*The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.*

Duct sealant shall be Polywater® FST™ Foam Sealant. Duct sealant shall be a 2-part, 98% closed-cell urethane foam. It shall react and set in 5-10 minutes at 70°F. It shall be capable of sealing 3/4"-10" conduits with multiple cable configurations. Duct sealant shall be reenterable. It shall be capable of withstanding temperatures from -40°F to 200° F; and be chemically resistant to gasoline, oils, dilute acids, and bases. Duct sealant shall not affect the physical or electrical properties of wire and cable.

Duct sealant shall have good adhesion to duct and cable jacket surfaces with good structural strength. It shall have 120-lb compressive strength (ASTM D1621). Duct sealant shall be capable of holding 22 ft. water head pressure continuous or 90 ft. water head pressure short-term. It shall block up to 5 psi gas or vapor continuous. It shall meet NEC codes for Raceway Seals, meet UL 94 fire rating HBF, and be UL recognized.

## Order Information

Cat #	Package Description
<b>FST-250</b> (12 units/case)	8½-oz two-part foam sealant caulking tube style with resealing cap 1 ea static mixing nozzle
<b>FST-250KIT1</b> (1 unit/case)	8½-oz two-part foam sealant caulking tube style with resealing cap 3 ea static mixing nozzles 4 ea 24-inch foam damming strips 1 12-inch abrasive strip
<b>FST-250KIT</b> (6 units/case)	1 pair disposable gloves 1 position rod 1 pre-treating wipe 1 instruction sheet
<b>TOOL-250</b> (1 unit/case)	Ratchet application tool for FST-250
<b>MXR-30T-10</b> (1 unit/case)	Mixing nozzle 10-pack (for FST-250)
<b>FST-MINI-1</b> (1 unit/case)	50-ml two-part foam sealant, dual cartridge with resealing cap 3 ea static mixing nozzles6 ea foam plugs
<b>FST-MINI-B6</b> (6 units/case)	1 pair disposable gloves 1 instruction sheet
<b>TOOL-50-11</b> (1 unit/case)	Dispensing tool for 50-ml cartridge, FST-MINI
<b>FST-DAM</b> (24 unit/case)	24-inch foam damming strip

\*\*Custom kits available. Call factory for details.

Quantity Calculator located online: [www.polywater.com/polywater-calculators/](http://www.polywater.com/polywater-calculators/)

FST™ Mastik, iki parçalı, yüksek genleşmeli, köpüklü bir kanal yalıtım malzemesidir. Su, asit, toz, gazlar, böcek ve kemirgenleri kanaldan uzak tutar. FST™ Mastik, genişleyip sertleşerek, kabloların çekildiği kanalın çevresinde "kapalı hücre" denebilecek dayanıklı bir yapı oluşturur. Bu kalıcı, ancak çıkarılabilir mastik conta kanala su ve gaz girişini bloke eder. Metal, plastik ya da beton kanala uygulanabilir, uygulanacak hacmin şekli önemli değildir ve kanalı sızdırmaz biçimde sıvılamak için gerekli her şey FST™ Mastik kiti ile birlikte sevk edilir.

## Polywater<sup>®</sup> J - High Performance Lubricant • Polywater<sup>®</sup> J - Kablo Çekme Sabunu

### TECHNICAL SPECIFICATION

#### Description

Polywater<sup>®</sup> Lubricant J is a high-performance cable pulling lubricant proven in the installation of millions of feet (meters) of cable over the last 20 years. Lubricant J provides excellent tension reduction in underground and industrial cable pulls. It is recommended for both communications and electrical cable. Polywater<sup>®</sup> J has excellent shear resistance for effective lubrication under high cable sidewall pressure in conduit bends.

The residue from Polywater<sup>®</sup> J does not propagate flame when used with fire- retardant cable systems. Lubricant J is slow drying. The residue is a thin, slippery film that retains its lubricity for months after use.

Its dried residue is non-conductive and noncombustible.

Polywater<sup>®</sup> Lubricant J is a stringy gel. It can be applied by hand or using Polywater's LP Pumps. It is also available in the unique Front End Pack<sup>™</sup> pre-lubrication bags.

#### Friction Testing

**Lubricity:** Polywater<sup>®</sup> J Lubricant shows superior friction reduction on a variety of jacket types. Typical friction coefficients at 200 lbs/ft (2.91 kN/m) normal pressure are shown. Test results are based on the method described in the white paper, "Coefficient of Friction Measurement on Polywater's Friction Table, 2007" (polywater.com/FTable.pdf). Values are averages based on cable jacket and conduit materials from multiple manufacturers.

Cable Jacket	Conduit Type				
	HDPE	PVC	Steel	FRP	EMT
XLPE	.14	.11	.13	.16	.21
LLDPE	.10	.11	.16	.13	.13
PVC	.11	.11	.13	.16	.11
HDPE	.05	.09	.13	.13	.13

Coefficient of friction data on additional or specific cable jackets or conduits can be obtained from American Polywater Corporation.



#### Product Benefits

- Specification grade
- Excellent friction reduction
- High cling factor
- Non-combustible residue
- Clean and non-staining
- Temperature stable

#### End Use

Suitable for many types of cable installations, including:

- Heavy, underground installations
- Multiple-bend pulls
- Long pulls
- High conduit fill situations

#### Official Approvals

UL Approved

CSA Listed

## Model Specification

The statement below may be inserted into a specific job specification to help maintain engineering standards and ensure project integrity.

The cable pulling lubricant shall be Polywater® J Lubricant. The lubricant shall be UL (or CSA) listed.

The lubricant shall contain **no** waxes, greases, silicones, or polyalkylene glycol oils. Lubricant manufacturer must provide cable manufacturer approvals upon request.

Cable jacket compatibility shall be tested by the IEEE 1210, Standard Tests for Determining Compatibility of i Cable-Pulling Lubricants with Wire and Cable. It shall pass physical compatibility tests on LLDPE, XLPE, PVC and EPR cable jacket or sheath materials. It i shall not stress crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE and EPR semiconducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.

A 200-gram sample of the lubricant, when placed in a one-foot, split metal conduit and fully dried for 24 hours at 105 degrees C, shall not spread a flame more than three inches beyond a point of ignition at a continued heat flux of 40 kW / meter<sup>2</sup>. Total time of test shall be one-half hour.

## Order Information

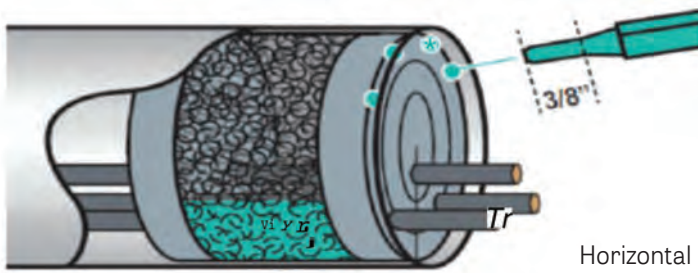
Cat #	Package Description
Regular	
J-35	1-quart squeeze bottle (0.95 liter)
J-128	1-gallon pail (3.78 liter)
J-640	5-gallon pail (18.9 liter)
J-27	1-quart bag (0.95 liter)
J-99	1-quart bag (0.95 liter) in a pail
J-55	½-gallon bag (1.9 liter)
J-110	½-gallon bag (1.9 liter) in a pail
J-Drum	55-gallon drum (208 liter)
Pourable	
PJ-128	1-gallon pail (3.78 liter)
PJ-320	2 ½- gallon jug (9.6 liter)
PJ-640	5-gallon pail (18.9 liter)
PJ-Drum	55-gallon drum (208 liter)
**Wintergrade version Polywater® PJ available (WPJ)	
Wintergrade	
WJ-35	1-quart squeeze bottle (0.95 liter),
WJ-55	½-gallon bag (1.9 liter)
WJ-110	½-gallon bag (1.9 Liter) in a pail
WJ-128	1-gallon pail (3.78 liter)
WJ-640	5-gallon pail (18.9 liter)
WJ-Drum	55-gallon drum (208 liter)

Polywater® Lubricant J, yüksek performanslı bir kablo çekme sabundur. Polywater® J, yer altı ve endüstriyel kablo çekmelerinde sürtünmeyi azaltır. Hem iletişim hem de elektrik kablosu için kullanılır.

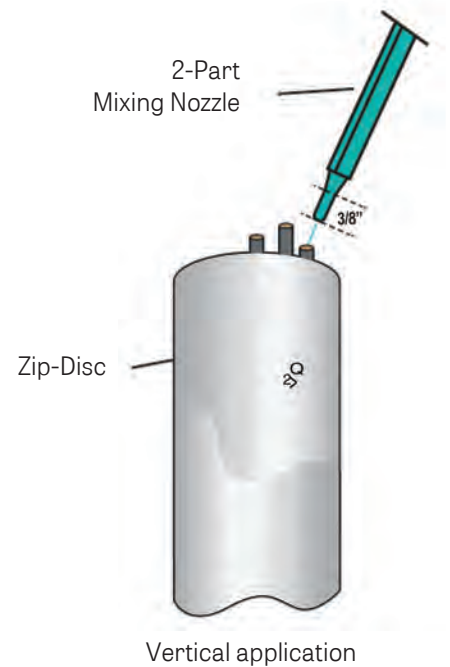
Polywater® J, boru dönüşlerinde kablo izolasyonunun sürtünme nedeniyle zarar görmesini önler. Polywater® J'nin kablo çekimi sonrası kablo üzerinde kalan kalıntıları alev iletmez özelliktedir ve benzer özellikteki kablolarla rahatlıkla kullanılabilir. Polywater® J, kullanıldıktan aylarca sonra dahi kayganlığı korur. Kurumuş artık kalıntısı iletken ve yanıcı değildir.

## Polywater<sup>®</sup> ZipSeal<sup>™</sup> Duct Sealant

ZipSeal<sup>™</sup> Duct Sealant is a practical and efficient way to seal innerducts and conduits. The revolutionary Zip-Disc insert and unique two-part foam installs quickly and effectively. This innovative design allows for horizontal and vertical installation with minimal drippage. The foam can be removed in just minutes. ZipSeal can hold up to 10 feet of water-head pressure.



Horizontal application



Vertical application

Cat. No.	Package Components	Case Qty
<b>ZIP-50KIT1</b>	150mL two-part foam sealant cartridge w/ resealing cap, 2 static mixing nozzles, 2 pairs disposable gloves 5 2" Zip-Discs	1
<b>ZIP-50KIT1G</b>	ZIP-50KIT1 w/ dispensing tool	1
<b>ZIP-50KITB6</b>	6 ZIP-50KIT1	6
<b>TOOL-50-11</b>	Dispensing tool	1
<b>MXR-20T-10</b>	Mixing nozzles	10

- Seals out Water, Sewer Gases, and Rodents From Conduits
- Installs in 45 Seconds
- Easy to Re-Enter
- Holds up to 10' of Water-Head Pressure
- One Kit Seals Five 2" (50mm) Conduits Compatible with Cables and Conduits







**NELSON**

**FIRE  
STOP  
PRODUCTS**





In a battle against fire, every second counts. That's especially true if openings exist between adjacent rooms or floors within a building, such as those made to accommodate pipe, conduit, ducts and cables. Such pathways for voice, data, video, power, plumbing and ventilation can quickly become pathways for fire.

The good news is, it doesn't take much to inhibit the spread of fire before it begins. For approximately 1/100th of the cost of constructing a building, you can install a building-wide Nelson Firestop Systems. Should a fire ever break out, that small investment will help contain it. The spreading that could occur in minutes will be delayed for hours giving fire-fighting personnel the critical time they need to extinguish the blaze, avert devastation and, in some cases, save lives.

That's what firestopping should do. What it will do, however, depends on whether or not you have the right products in the right places. No one ever intentionally creates a poor firestop installation, but the selection process frequently yields an incorrect seal.

### Solving a complex problem.

Making the right firestopping choice for a wall or floor penetration is not a simple matter. There is far more to the decision than the size of the hole. Establishing a reliable firestop seal depends on no less than eleven criteria:

- Type of barrier being penetrated (wall or floor)
- Thickness of barrier
- Barrier construction (masonry or gypsum)
- Fire rating of barrier (1, 2, 3 or 4-hour)
- Type of penetrating item (pipe, cable, conduit, etc.)
- Construction of penetrating item (plastic, steel, copper, etc.)
- Size of penetrating item, and how many of each
- Type and thickness of insulation (if any)
- Shape of opening
- Size of opening
- Annular space between penetrating item and inside wall of penetration

### Composite Sheets and Inserts • Yangına Dayanımlı Plaka

Nelson Firestop composite sheets are used to seal penetrations and maintain the rating of fire rated floors or walls. Suited for cable tray penetrations, large floor or wall openings, and other cable systems they are available in a variety of sizes.



### Firestop Coatings and Compounds Yangına Dayanımlı Harç

Nelson Firestop FSC cable coating, FSC3 joint coating and CMP compound are all used to provide a fire protective coating for cables, floor and other areas needing sealing.



### Firestop FSP Putty • Yangına Dayanımlı Macun

Nelson Firestop Putty (FSP) is easy to install putty that inhibits the passage of smoke and flame through penetrations and joints.



### Firestop Mineral Wool • Yangına Dayanımlı Mineral Yün

Nelson Firestop mineral wool is used in many Firestop Systems in conjunction with various Firestop Sealants to assure the integrity of the fire rated seal against the spread of fire, smoke and gasses.



### Firestop Sealants • Yangına Dayanımlı Mastik

Nelson Firestop provides silicone, elastometric and latex sealants for protecting against the spread of fire, smoke, gases and water



### MCT Multi-Cable Transit Systems Kablo Geçiş Sistemleri

Nelson Firestop MCT multi-cable transit system is a mechanical cable and pipe sealing system for use in commercial building wall floor penetrations and in marine bulkhead and deck applications. Provides protection from fire smoke water and blast pressures.



### MPS Multi-Plug System • Kablo / Boru Sargıları

Nelson Firestop MPS multi-plug system is a fire rated, environmental cable sealing system with molded Tecron rubber plugs for use in pipe sleeves or cast round openings. provides protection from fire, smoke, water and blast pressures.



### Pipe Choke and Wrap Systems • Boru Kelepçe Sistemleri

Nelson Firestop pipe choke system (PCS) is designed to expand to seal voids created from fire exposure to penetrations of combustible pipes. It maintains the rating of fire rated floors and walls.



### PLW Pillows & Fire Bricks Yangına Dayanımlı Tuğla/Yastık

Nelson Firestop PLW pillows and fire bricks are used for cable, cable tray and other penetrations or for temporary firestop closures by preventing the penetration of fire





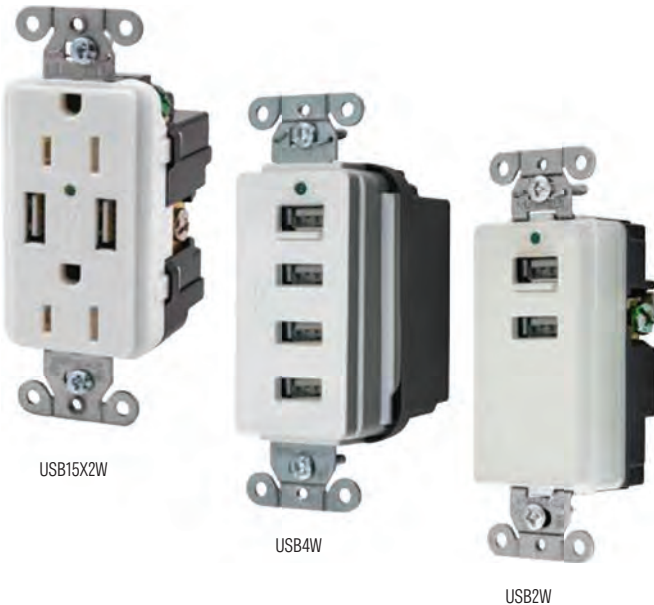
# HUBBELL

WIRING DEVICE - KELLEMS





Straight Blade Devices  
**USB Charger Receptacles and Outlets**  
Features and Benefits



**Receptacle Features**

- Two USB ports 3.8 Amp, 5V DC, type A, class 2.0
- Tamper-Resistant decorator duplex receptacle
- Standard and Hospital grade
- cULus listed to UL498 and UL1310

**4 Port Features**

- Four USB ports 5 Amp, 5V DC, type A, class 2.0
- Switch activated port door; when opened delivers power, when closed shuts OFF power for “zero” consumption
- cETLus listed to UL 1310

**Port Features**

- Two USB ports 3 Amp, 5V DC, type A, class 2.0
- Switch activated port door; when opened delivers power, when closed shuts OFF power for “zero” consumption
- Shallow depth to fit in delivery systems and for OEM use

**USB Charger Duplex Receptacles**

Description	Color	Catalog Number	Catalog Number
USB Charger Tamper-Resistant receptacle, Two USB Type 2.0 ports 3.8 Amp, 5 Volt DC, 15 or 20 Amp, 125 Volt AC decorator duplex.	Black	USB15X2BK	USB20X2BK
	Brown	USB15X2	USB20X2
	Gray	USB15X2GY	USB20X2GY
	Ivory	USB15X2I	USB20X2I
	Light Almond	USB15X2LA	USB20X2LA
	White	USB15X2W	USB20X2W

Note: See page Tech-10 for Tamper-Resistant descriptions.  
See page A-9 for Hospital Grade version.  
See page A-60 for technical information.

**USB Charger 4 Port Outlet**

Description	Color	Catalog Number
USB Charger 4 Port Outlet, Four USB Type 2.0 Ports 5 Amp, 5 Volt DC decorator.	Black	USB4BK
	Brown	USB4
	Gray	USB4GY
	Ivory	USB4I
	Light Almond	USB4LA
	White	USB4W

**USB Charger 2 Port Outlet, Shallow Profile**

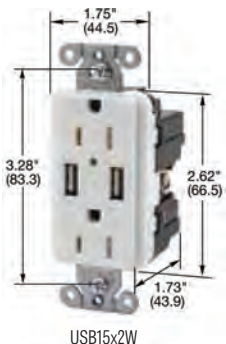
Description	Color	Catalog Number
USB Charger 2 Port Outlet, Shallow Profile, Two USB Type 2.0 Ports 3 Amp, 5 Volt DC decorator.	Black	USB2BK
	Brown	USB2
	Gray	USB2GY
	Ivory	USB2I
	Light Almond	USB2LA
	White	USB2W



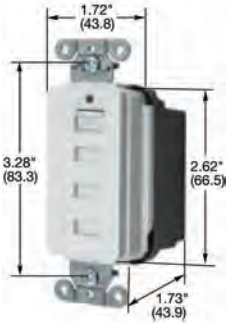
15A 125 V  
NEMA 5-15R  
UL CSA  
0.5 HP



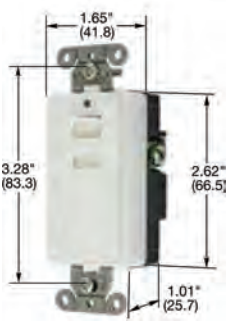
20A 125 V  
NEMA 5-20R  
UL CSA  
1 HP



USB15x2W



USB4W



USB2W

Dimensions in inches (mm)



## Straight Blade Devices 15 and 20 Ampere, 125 Volts 2 Pole, 3 Wire Grounding



15A 125 V  
NEMA 5-15R  
UL CSA  
0.5 HP



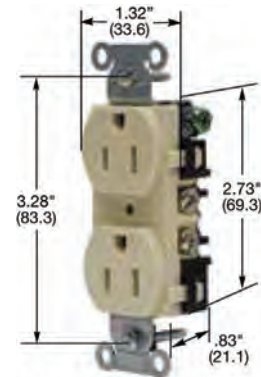
20A 125 V  
NEMA 5-20R  
UL CSA  
1 HP

### Commercial Specification Grade Receptacles

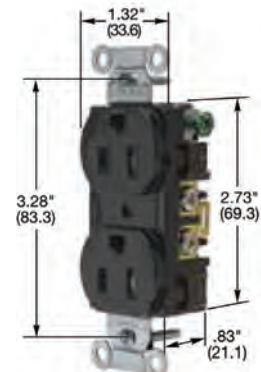
#### Duplex

Description	Color	Catalog Number	Catalog Number
Smooth nylon face, duplex, side wired only.	Almond	CR15AL	CR20AL
	Black	CR15BLK	CR20BLK
	Brown	CR15	CR20
	Gray	CR15GRY	CR20GRY
	Ivory	CR15I	CR20I
	Light Almond	CR15LA	CR20LA
	Office White	CR15OW	CR20OW
	White	CR15WHI	CR20WHI
Tamper-Resistant*, smooth nylon face, duplex, side wired only.	Almond	CR15ALTR	CR20ALTR
	Black	CR15BLKTR	CR20BLKTR
	Brown	CR15TR	CR20TR
	Gray	CR15GRYTR	CR20GRYTR
	Ivory	CR15ITR	CR20ITR
	Light Almond	CR15LATR	CR20LATR
	White	CR15WHITR	CR20WHITR
Finder groove, nylon face, duplex, side wired only.	Almond	CRF15AL	CRF20AL
	Black	CRF15BLK	CRF20BLK
	Brown	CRF15	CRF20
	Gray	CRF15GRY	CRF20GRY
	Ivory	CRF15I	CRF20I
	Light Almond	CRF15LA	CRF20LA
	Office White	CRF15OW	CRF20OW
	White	CRF15WHI	CRF20WHI
Pre-wired receptacles, smooth nylon face, duplex, side wired only, self-grounding, 8" solid wire leads.	Black	CR15BLKP1	CR20BLKP1
	Brown	CR15P1	CR20P1
	Gray	CR15GRYP1	CR20GRYP1
	Ivory	CR15IP1	CR20IP1
	Light Almond	CR15LAP1	CR20LAP1
	White	CR15WHIP1	CR20WHIP1
Pre-wired receptacles, smooth nylon face, duplex, side wired only, self-grounding, 8" stranded wire leads.	Black	CR15BLKP2	CR20BLKP2
	Brown	CR15P2	CR20P2
	Gray	CR15GRYP2	CR20GRYP2
	Ivory	CR15IP2	CR20IP2
	Light Almond	CR15LAP2	CR20LAP2
	White	CR15WHIP2	CR20WHIP2
Pre-wired receptacles, Tamper-Resistant*, smooth nylon face, duplex, side wired only, self-grounding, 8" solid wire leads.	Black	CR15BLKTRP1	CR20BLKTRP1
	Brown	CR15TRP1	CR20TRP1
	Gray	CR15GRYTRP1	CR20GRYTRP1
	Ivory	CR15ITRP1	CR20ITRP1
	Light Almond	CR15LATRP1	CR20LATRP1
	White	CR15WHITRP1	CR20WHITRP1
Pre-wired receptacles, Tamper-Resistant*, smooth nylon face, duplex, side wired only, self-grounding, 8" stranded wire leads.	Black	CR15BLKTRP2	CR20BLKTRP2
	Brown	CR15TRP2	CR20TRP2
	Gray	CR15GRYTRP2	CR20GRYTRP2
	Ivory	CR15ITRP2	CR20ITRP2
	Light Almond	CR15LATRP2	CR20LATRP2
	White	CR15WHITRP2	CR20WHITRP2

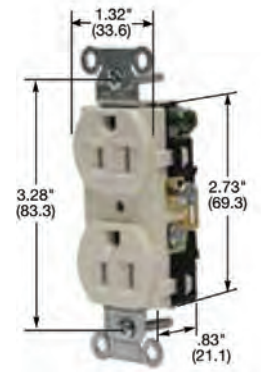
Note: \*Tamper-resistant devices are not Fed. Spec. Listed.  
See page A-50 for accessories.  
See pages A-62 and A-63 for technical information.  
See page Tech-10 for Tamper-Resistant descriptions.  
See section N for wallplates.



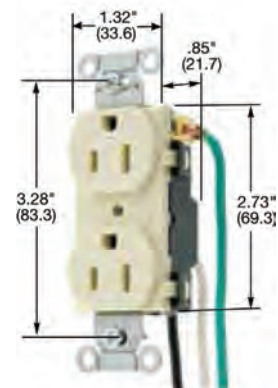
CR15I



CR15TR



CRF-15LA

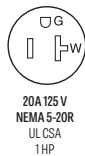
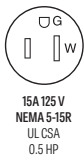


CR15IP-1

Dimensions in  
inches (mm)



Straight Blade Devices  
15 and 20 Ampere, 250 Volts  
2 Pole, 3 Wire Grounding



Receptacles

HBL® Extra Heavy Duty, Specification Grade, Duplex

Description	Color	Catalog Number	Catalog Number
Flush, nylon face, back and side wired, multiple drive screws.	Black	-	HBL5462BK
	Brown	HBL5662	HBL5462
	Gray	-	HBL5462GY
	Ivory	HBL5662I	HBL5462I
	Red	-	HBL5462R
Isolated ground <sup>A</sup> .	Orange	IG5662	IG5462

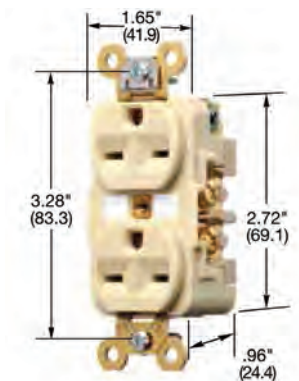
HBL® Extra Heavy Duty, Specification Grade, Single

Description	Color	Catalog Number	Catalog Number
Description Flush, nylon face, back and side wired.	Brown	HBL5661	HBL5461
	Gray	-	HBL5461GY
	Ivory	HBL5661I	HBL5461I
	Red	-	HBL5461R
	White	-	HBL5461W
Isolated ground <sup>A</sup> .	Orange	IG5661	IG5461
Panel mount 1.94 in. (49.3) centers.	Brown	HBL5684	-
Ring terminal connection.	Brown	HBL5661RT	-

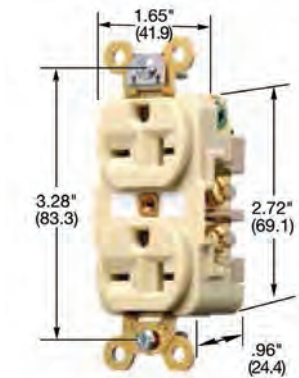
HBL® Extra Heavy Duty, Specification Grade  
Duplex and Single Panel Mount

Description	Color	Catalog Number	Catalog Number
Flush, nylon duplex face, side wired only.	Brown	HBL5652	-
	Ivory	HBL5652I	-
Panel mount 1.75 in. (44.5) centers.	Brown	HBL5658	-

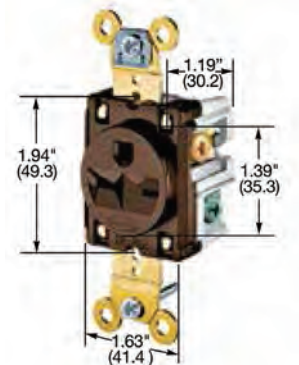
Note: <sup>A</sup>See section M for additional information on isolated ground devices.  
HP ratings are AC only.  
See page A-50 for accessories.



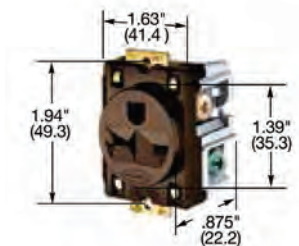
HBL5662I



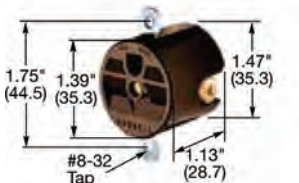
HBL5462I



HBL5661



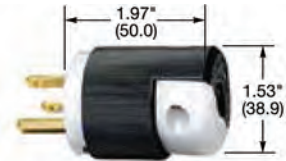
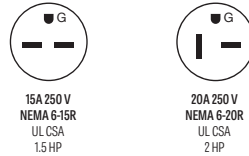
HBL5684



HBL5658

Dimensions in  
inches (mm)

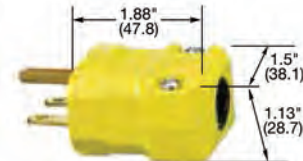
Straight Blade Devices  
**15 and 20 Ampere, 250 Volts**  
2 Pole, 3 Wire Grounding



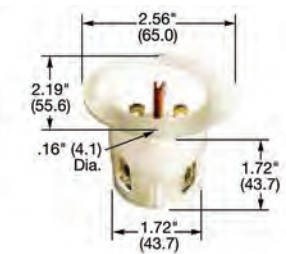
HBL5666C



HBL5666CA



HBL5666VY



HBL5678C



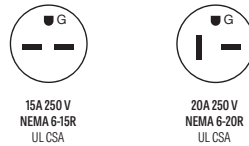
Dimensions in inches (mm)

Plugs

Description	Cord Diameter	Catalog Number	Catalog Number
Insulgrip® Plug, black and white nylon.	.230"-.720" (5.8-18.3)	HBL5666C	HBL5466C
Insulgrip® Plug, corrosion resistant, yellow nylon.	.230"-.720" (5.8-18.3)	HBL56CM66C	HBL54CM66C
8-Position Insulgrip® Angle Plug, black and white nylon.	.325"-.655" (8.3-16.6)	HBL5666CA	HBL5466CA
Valise® Plug, yellow nylon.	.220"-.660" (5.6-16.8)	HBL5666VY	HBL5464VY

Note: See page A-51 for accessories.

Insulgrip® Flanged Inlets



Description	Catalog Number	Catalog Number
Nylon casing, back wired.	HBL5678C	HBL5478C

Note: Flanged inlets are not HP rated. See page A-51 for accessories.

For quick visual identification of circuits or configurations.

Colored Cord Clamps\*

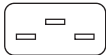
Description	Color	Catalog Number
For use with 15A and 20A, 2 pole/3 wire, insulgrip plugs and connectors with cord diameter range of .230"-.720" (5.8-18.3) only.	Blue	HBLCORDCLAMPBL
	Green	HBLCORDCLAMPGN
	Orange	HBLCORDCLAMPOR
	Purple	HBLCORDCLAMPPP
	Red	HBLCORDCLAMPRL
	Yellow	HBLCORDCLAMPY

Note: \*Clamp only. Contains no screws. Order in increments of 10. Not UL Listed or CSA Certified.

Straight Blade Devices  
**16 Ampere, 250 Volts AC International**  
2 Pole, 3 Wire Grounding



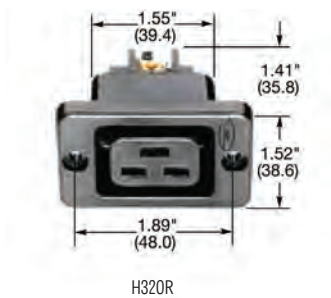
Receptacle IEC 320 Compatible



Description	Catalog Number
20/16A 250V AC IEC straight blade.	H320R
For Ring Terminal connection.	H320RRT

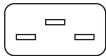
Note: \*Not UL Listed.

Dimensions in inches (mm)



Connector

IP20  
SUITABILITY



Description	Catalog Number
20/16A 250V AC IEC straight blade.	H320C



Plug IEC 320 Compatible

IP20  
SUITABILITY



Description	Catalog Number
20/16A 250V AC IEC straight blade.	H320P

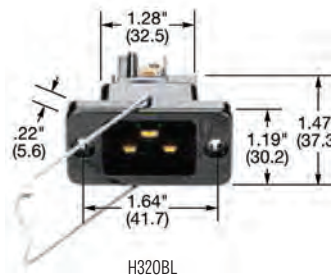
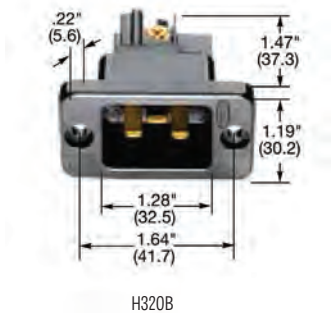


Inlets



Description	Catalog Number
20/16A 250V AC IEC straight blade.	H320B
20/16A 250V AC IEC straight blade with retention clamp.	H320BL

Note: See page A-67 for technical information.







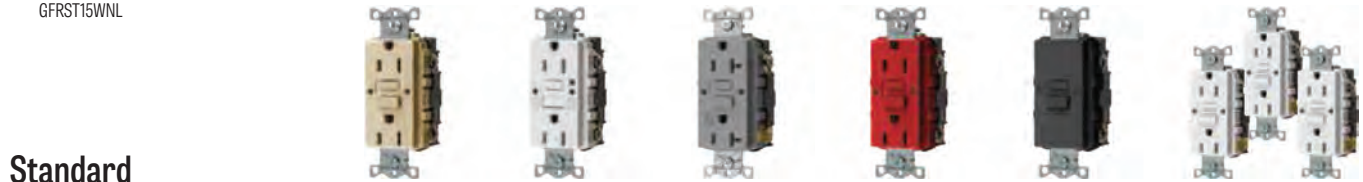
GFRST15WNL

## Ground Fault Products Commercial Standard GFCI Receptacles

### Features

- Patented AUTOGUARD® self test technology includes disconnecting power to the receptacle if critical components are damaged and GFCI protection is lost

- Internal back wiring clamp and guide for quick and secure termination
- Night light option includes light sensor controls for automatic on and off, custom dual lens for optimum light output





### Standard

Rating	Color	Standard	Night Light Two LED Night Lights	Alarm	Assembled in USA	Blank Face Available in 20A Only	Standard 3-Pack Three Devices per Pack
	Almond	GFRST15AL	GFRST15ALNL	GFRST15ALB	GFRST15ALU	—	—
	Black	GFRST15BK	GFRST15BKNL	GFRST15BKB	GFRST15BKU	—	—
	Brown	GFRST15	GFRST15NL	GFRST15B	GFRST15U	—	—
	Gray	GFRST15GY	GFRST15GYNL	GFRST15GYB	GFRST15GYU	—	—
	Ivory	GFRST15I	GFRST15INL	GFRST15IB	GFRST15IU	—	GFRST15I3
	Light Almond	GFRST15LA	GFRST15LANL	GFRST15LAB	GFRST15LAU	—	GFRST15LA3
	Red	GFRST15R	GFRST15RNL	GFRST15RB	GFRST15RU	—	—
	White	GFRST15W	GFRST15WNL	GFRST15WZB	GFRST15WU	—	GFRST15W3
	Almond	GFRST20AL	GFRST20ALNL	GFRST20ALB	GFRST20ALU	GFBFST20AL	—
	Black	GFRST20BK	GFRST20BKNL	GFRST20BKB	GFRST20BKU	GFBFST20BK	—
	Brown	GFRST20	GFRST20NL	GFRST20B	GFRST20U	GFBFST20	—
	Gray	GFRST20GY	GFRST20GYNL	GFRST20GYB	GFRST20GYU	GFBFST20GY	—
	Ivory	GFRST20I	GFRST20INL	GFRST20IB	GFRST20IU	GFBFST20I	GFRST20I3
	Light Almond	GFRST20LA	GFRST20LANL	GFRST20LAB	GFRST20LAU	GFBFST20LA	GFRST20LA3
	Red	GFRST20R	GFRST20RNL	GFRST20RB	GFRST20RU	GFBFST20R	—
	White	GFRST20W	GFRST20WNL	GFRST20WB	GFRST20WU	GFBFST20W	GFRST20W3

### Standard SNAPConnect®



Rating	Color	Standard
 <b>15A 125V</b> <b>NEMA 5-15R</b> UL CSA 0.5 HP	Almond	GFRST15SNAPAL
	Black	GFRST15SNAPBK
	Brown	GFRST15SNAP
	Gray	GFRST15SNAPGY
	Ivory	GFRST15SNAPI
	Light Almond	GFRST15SNAPLA
	Red	GFRST15SNAPR
	White	GFRST15SNAPW
 <b>20A 125V</b> <b>NEMA 5-20R</b> UL CSA 1 HP	Almond	GFRST20SNAPAL
	Black	GFRST20SNAPBK
	Brown	GFRST20SNAP
	Gray	GFRST20SNAPGY
	Ivory	GFRST20SNAPI
	Light Almond	GFRST20SNAPLA
	Red	GFRST20SNAPR
	White	GFRST20SNAPW

### Right Angle Pigtailed Terminal



Description	Type	Catalog Number
Clear right angle terminal with 6 inch leads,	Solid	SNAP1RA
600V, #12 AWG THHN/THWN-2, Polycarbonate housing material.	Stranded	SNAP2RA



## Switches

### 15 and 20 Ampere, 120-277 Volts AC

Specification Grade Commercial Series

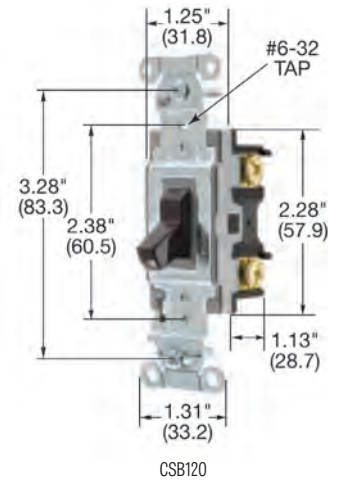


#### Specification Grade Commercial Series, 15A, 120-277V AC

Description	Toggle Color	Single Pole	Double Pole	Three Way	Four Way
Toggle, back and side wired.	Almond	CSB115AL	CSB215AL	CSB315AL	CSB415AL
	Black	CSB115BK	CSB215BK	CSB315BK	CSB415BK
	Brown	CSB115	CSB215	CSB315	CSB415
	Gray	CSB115GY	CSB215GY	CSB315GY	CSB415GY
	Ivory	CSB115I	CSB215I	CSB315I	CSB415I
	Light Almond	CSB115LA	CSB215LA	CSB315LA	CSB415LA
	White	CSB115W	CSB215W	CSB315W	CSB415W

#### Specification Grade Commercial Series, 20A, 120-277V AC

Description	Toggle Color	Single Pole	Double Pole	Three Way	Four Way
Toggle, back and side wired.	Almond	CSB120AL	CSB220AL	CSB320AL	CSB420AL
	Black	CSB120BK	CSB220BK	CSB320BK	CSB420BK
	Brown	CSB120	CSB220	CSB320	CSB420
	Gray	CSB120GY	CSB220GY	CSB320GY	CSB420GY
	Ivory	CSB120I	CSB220I	CSB320I	CSB420I
	Light Almond	CSB120LA	CSB220LA	CSB320LA	CSB420LA
	Red	CSB120R	CSB220R	CSB320R	CSB420R
	White	CSB120W	CSB220W	CSB320W	CSB420W

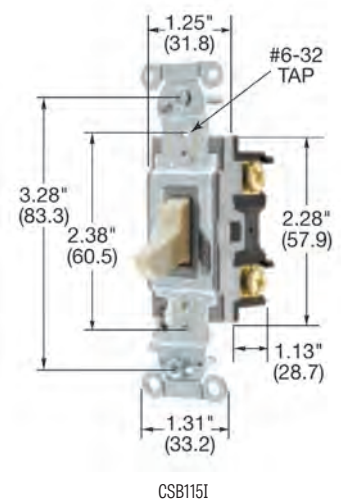


#### Specification Grade Commercial Series, 15A, 120-277V AC

Description	Toggle Color	Single Pole	Double Pole	Three Way	Four Way
Toggle, side wired only.	Almond	CS115AL	—	CS315AL	—
	Black	CS115BK	—	CS315BK	—
	Brown	CS115	—	CS315	—
	Gray	CS115GY	—	CS315GY	—
	Ivory	CS115I	—	CS315I	—
	Light Almond	CS115LA	—	CS315LA	—
	White	CS115W	—	CS315W	—

#### Specification Grade Commercial Series, 20A, 120-277V AC

Description	Toggle Color	Single Pole	Double Pole	Three Way	Four Way
Toggle, side wired only.	Almond	CS120AL	—	CS320AL	—
	Black	CS120BK	—	CS320BK	—
	Brown	CS120	—	CS320	—
	Gray	CS120GY	—	CS320GY	—
	Ivory	CS120I	—	CS320I	—
	Light Almond	CS120LA	—	CS320LA	—
	White	CS120W	—	CS320W	—



Note: See page D-9 for pre-wired/leaded devices. See page D-13 for accessories.  
See page D-15 for wallplates.  
See page D-20 for technical information.

#### HP Conversion Chart

	120 V	208V	240V	277V AC
15A	.5HP	1.5HP	2HP	2HP
20A	1HP	2HP	2HP	2HP

Dimensions in inches (mm)

## Switches

### 600 to 2000 Watts, 120 Volts AC 60Hz

#### Slide and Rotary Control Dimmers

#### Architectural Grade, Incandescent Preset Slide Control Dimmers

Description	Color	Rating	Catalog Number
Single pole/three way - preset.	White	600W, 120V AC, 60Hz	AS63
Single pole/three way - preset.	White	1000W, 120V AC, 60Hz	AS103
Single pole/three way - preset.	White	1500W, 120V AC, 60Hz	AS153
Single pole/three way - preset.	White	2000W, 120V AC, 60Hz	AS203



600 and 1000W Dimmer Fits  
Single-Gang Wall Boxes.  
AS63 and AS103

#### Accessories

Description	Color	Catalog Number
Small plate kit for 600W and 1000W models. Includes non-metallic trimplate and slide.	Ivory White	AS1I AS1W
Large plate kit for 1500W and 2000W models. Includes non-metallic trimplate and slide.	Ivory White	AS2I AS2W

Note: The dimmers listed above can be wired for single pole or three way applications.  
See page D-17 for ganging and derating.



1500 and 2000W Dimmer Fits  
Single-Gang Wall Boxes.  
AS153 and AS203

#### Architectural Grade, Incandescent Rotary Control Dimmers

Description	Color	Rating	Catalog Number
Single pole - push on/off.	Beige	600W, 120V AC, 60Hz	AR61
Three way - push on/off.	Beige		AR63
Single pole - push on/off.	Beige	1000W, 120V AC, 60Hz	AR101
Three way - push on/off.	Beige		AR103
Single pole, rotary on/off.	Beige	1500W, 120V AC, 60Hz	AR151
Single pole, rotary on/off.	Beige	2000W, 120V AC, 60Hz	AR201

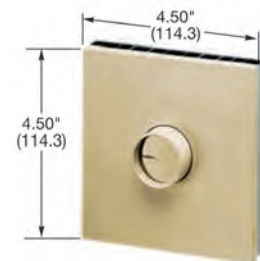


600 and 1000W Dimmer Fits  
Single-Gang Wall Boxes.  
AR61 and AR101

#### Accessories

Description	Color	Catalog Number
Small plate kit for 600W and 1000W models. Includes non-metallic trimplate and knob.	Beige White	AR1BE AR1W
Large plate kit for 1500W and 2000W models. Includes non-metallic trimplate and knob.	Beige White	AR2BE AR2W

Note: See page D-17 for ganging and derating.



1500 and 2000W Dimmer Fits  
Single-Gang Wall Boxes.  
AR151 and AR201



Switches  
Accessories  
Nylon and Metal Wallplates



1- Gang



2- Gang



3- Gang

Standard Size, Smooth Nylon, Toggle Switch Plates

Color	Catalog Number	Catalog Number	Catalog Number
Almond	NP1AL	NP2AL	NP3AL
Black	NP1BK	NP2BK	NP3BK
Brown	NP1	NP2	NP3
Gray	NP1GY	NP2GY	NP3GY
Ivory	NP1I	NP2I	NP3I
Light Almond	NP1LA	NP2LA	NP3LA
Office White	NP1OW	NP2OW	NP3OW
Red	NP1R	NP2R	—
White	NP1W	NP2W	NP3W



Standard Size, Smooth Metal, Toggle Switch Plates

Color	Catalog Number	Catalog Number	Catalog Number
Aluminum	SA1	SA2	①
Brass	SB1	SB2	SBP3*
Stainless Steel, 302/304	SS1	SS2	SS3
Stainless Steel, 430	SS1L	SS2L	SS3L



1- Gang



2- Gang



3- Gang

Standard Size, Smooth Nylon, Style Line® Switch Plates

Color	Catalog Number	Catalog Number	Catalog Number
Almond	NP26AL	NP262AL	NP263AL
Black	NP26BK	NP262BK	NP263BK
Brown	NP26	NP262	NP263
Gray	NP26GY	NP262GY	NP263GY
Ivory	NP26I	NP262I	NP263I
Light Almond	NP26LA	NP262LA	NP263LA
Office White	NP26OW	NP262OW	NP263OW
Red	NP26R	NP262R	NP263R
White	NP26W	NP262W	NP263W



Standard Size, Smooth Metal, Style Line® Switch Plates

Color	Catalog Number	Catalog Number	Catalog Number
Aluminum	①	①	①
Brass	SB26	SB262	①
Stainless Steel, 302/304	SS26	SS262	SS263
Stainless Steel, 430	SS26L	SS262L	—

Note: See section N for additional waiipiates.  
\*Brass plated.  
① Available as a custom metal waiipiate. See section N for additional information.



## Straight Blade Devices

### Accessories

For 15 and 20 Ampere, 125 and 250 Volts and 277 Volts AC Devices



#### Wallplates, 1-Gang

Description	Color	Duplex Receptacles Catalog Number	Style Line® Receptacles Catalog Number	Single Receptacle Plate 1.40 in. (35.6) Dia. Catalog Number
Nylon, smooth.	Almond	NP8AL	NP26AL	NP7AL
	Black	NP8BK	NP26BK	NP7BK
	Brown	NP8	NP26	NP7
	Gray	NP8GY	NP26GY	NP7GY
	Ivory	NP8I	NP26I	NP7I
	Light Almond	NP8LA	NP26LA	NP7LA
	Office White	NP8OW	NP26OW	NP7OW
	Orange	NP8OR	-	-
	Red	NP8R	NP26R	NP7R
	White	NP8W	NP26W	NP7W
Stainless steel 302/304, .035 in. (0.9) horizontal brushed finish.		SS8	SS26	SS7
Brass .04 in. (1.0), horizontal brushed finish.		SB8	SB26	SB7
Aluminum .05 in. (1.3), horizontal brushed finish.		SA8	-	SA7



NP8



NP26I



SS7

#### Weatherproof Covers

Description	Duplex Receptacles Catalog Number	Single Receptacle Plate 1.40 in. (35.6) Dia. Catalog Number
RTP, gray, for FS/FD box mounting.	HBL5221	HBL7423WO
RTP, yellow, for FS/FD box mounting.	HBL52CM21	HBL74CM23WO
RTP, gray, for device mounting.	HBL5222	-
RTP, yellow, for device mounting.	HBL52CM22	-
Cast aluminum for FS/FD box mounting.	HBL5206WO	HBL7420
Cast aluminum for device mounting.	HBL5205WO	-

Note: All weatherproof plates are UL Listed for Wet Locations.  
Those with suffix WO are listed for use with cover open, all others with cover closed.  
RTP is an abbreviation for reinforced thermoplastic polyester.  
See section N for additional information on cover plates.



HBL52CM22



HBL5206WO



HBL5206WO

## ENCLOSURES • KORUMA TÜRLERİ

Elektrik Ekipmanlarının Amerikan (NEC, UL, NEMA), Kanada (CSA) ve Avrupa (IEC, DIN) Normlarına Göre Korunma Sınıfları

Aşağıdaki tablo koruma türleri arasında kaba bir karşılaştırma yapıyor.

Koruma türlerine ilişkin testler farklı yöntemlerle yapıldığından, tam bir karşılaştırma mümkün değildir.

NEC NFPA 70 (National Electrical CODE)'ye göre UL 50'e göre NEMA No 250-1991'e göre	NEMA ICS6-1983'e göre EEMAC E 14-22'ye göre	CSA-C22.1'e göre Koruma Sınıfının tanımı (Canadian Electric Code) CSA-C22.2 No.94	IEC 529/ DIN 40 050'ye göre kıyaslanabilir koruma türleri
Koruma Sınıfı 1, NEMA-1	Koruma Sınıfı 1, genel uygulama	Koruma Sınıfı 1, Genel kullanım için koruma	IP 20
Koruma Sınıfı 2, Damla sızdırmaz NEMA-2	Koruma Sınıfı 2, damla sızdırmaz	Koruma Sınıfı 2 Damlamaya karşı Koruma	IP 22
Koruma Sınıfı 3, toz sızdırmaz, yağmur sızdırmaz NEMA-3	Koruma Sınıfı 3, toz sızdırmaz, yağmur sızdırmaz, doluya ve buza karşı dayanıklı	Koruma Sınıfı 3 Kötü hava koşullarına karşı koruma	IP 54
Koruma Sınıfı 3R, yağmura karşı güvenli NEMA-3R	Koruma Sınıfı 3R, yağmura karşı güvenli, doluya ve buza karşı dayanıklı		
Koruma Sınıfı 3S, toza karşı güvenli, yağmura karşı güvenli NEMA-3S	Koruma Sınıfı 3S, toza karşı güvenli, yağmura karşı güvenli, doluya ve buza karşı güvenli		
Koruma Sınıfı 4, suya karşı güvenli, yağmura karşı güvenli NEMA-4	Koruma Sınıfı 3S, toza karşı güvenli, yağmura karşı güvenli, doluya ve buza karşı güvenli	Koruma Sınıfı 4 Su sızdırmaz koruma	IP 65
Koruma Sınıfı 4X, yağmura karşı güvenli, suya karşı güvenli, korozyona dayanıklı NEMA-4X	Koruma Sınıfı 4X, yağmura karşı güvenli, suya karşı güvenli, korozyona dayanıklı		IP65I
Koruma Sınıfı 6, yağmura karşı sızdırmaz NEMA-6	Koruma Sınıfı 6, toz sızdırmaz, su sızdırmaz, daldırılabilir, doluya ve buza karşı dayanıklı		
Koruma Sınıfı 6P, yağmur sızdırmaz, korozyona karşı			
Koruma Sınıfı 11, damla sızdırmaz, korozyona karşı dayanıklı	Koruma Sınıfı 11, damla sızdırmaz, korozyona karşı dayanıklı, yağa daldırılabilir		
Koruma Sınıfı 12, toz sızdırmaz, damla sızdırmaz	Koruma Sınıfı 12, endüstride kullanım, damla sızdırmaz, toz sızdırmaz	Koruma Sınıfı 5 toz sızdırmaz koruma	IP 54
Koruma Sınıfı 13K, (Tip 12'deki gibi)			
Koruma Sınıfı 13, toz sızdırmaz, damla sızdırmaz	Koruma Sınıfı 13, toz sızdırmaz, yağ sızdırmaz		

## CONVERSION TABLES • ÇEVİRİM TABLOLARI

### UZUNLUK

1 in	2.54 cm
1 ft	0.31 m
1 yd	0.91 m
1 mi	1.60 km
1 cm	0.39 in
1 m	36 in 1.09 yd
1 km	1.760 yd 0.62 mi

### ALAN

1 metrekafe	= 10.000cm <sup>2</sup>	= 1,20 sq yd
(m <sup>2</sup> )		
1 hektar (ha)	= 10.000 m <sup>2</sup>	= 2,47 dönüm
1 kilometrekare	= 100 ha	= 0,39 sq mi
(km <sup>2</sup> )		
1 yard kare	= 9 sq ft	= 0,84 m <sup>2</sup>
1 dönüm	= 4.840 sa vd	= 4.05 m <sup>2</sup>

### AĞIRLIK

1 ons (oz)	= 437,5 grains	= 28,350 g
1 pound (lb)	= 16 oz	= 0,4536 kg
1 stone	= 14 lb	= 6,35 kg
1 ton	= 2.240 lb	= 0,0161 t
1 gram (g)	= 1,000 mg	= 0,0353 oz
1 kilogram (kg)	= 1.000 g	= 2,2046 lb
1 ton	= 1.000 kq	= 0,9842 ton

### KALINLIK

gauge ga.	fractions of Inch	millimeters mm
12	7/64	2,778125
14	5/64	1,984375
16	1/16	1,587500
18	1/20	1,270000
20	3/80	0,952500

### HACİM

1 kübik yard	= 27 cu ft	= 0,77 m <sup>3</sup>
1 Pint (pt)	= 4 gills	= 0,57 L
1 galon (gal)	= 8 pt	= 4,55 L
1 desimetreküp	= 1,000 cm <sup>3</sup>	= 0,04 cu ft
(dm <sup>3</sup> )		
1 metreküp	= 1,000 dm <sup>3</sup>	= 1,31 cu yd
(m <sup>3</sup> )		
1 litre (L)	= 1 dm <sup>3</sup>	= 0,22 gal

### KABLO KESİTLERİ

USA/ CANADA	AVRUPA	
AWG/ circular mil	mm <sup>2</sup> (tam olarak)	mm <sup>2</sup> (bir üst kademede standart değeri)
22	0,326	0,4
21	0,411	
20	0,518	0,5
19	0,653	
18	0,823	0,75
17	1,04	1
16	1,31	1,50
15	1,65	
14	2,08	2,5
13	2,62	
12	3,31	4
11	4,17	
10	5,26	6
9	6,63	
8	8,37	10
7	10,50	
6	13,30	16
5	16,80	
4	21,20	25
3	26,70	
2	33,60	35
1	42,40	

USA/ CANADA	AVRUPA	
AWG/ circular mil	mm <sup>2</sup> (tam olarak)	mm <sup>2</sup> (bir üst kademede standart değeri)
1/0	53,50	50
2/0	67,40	70
3/0	85	
4/0	107	95
250 MCM	127	120
300 MCM	152	150
350 MCM	177	185
400 MCM	203	
450 MCM	228	
500 MCM	253	240
550 MCM	279	
600 MCM	304	300
650 MCM	329	
700 MCM	355	
750 MCM	380	
800 MCM	405	
850 MCM	431	
900 MCM	456	
950 MCM	481	
1,000 MCM	507	500
1,300 MCM	659	625

### İNGİLİZCE / TÜRKÇE KAVRAMLAR

- 1) NEMA = National Electrical Manufacturers Association
  - 2) EEMAC= Electrical and Electronic Manufacturers Association of Canada (Kanada Elektrik ve Elektronik Üreticileri Birliği)
- drip-tight: Damla sızdırmaz  
dust-tight: Toz sızdırmaz  
rain-tight: Yağmur sızdırmaz  
rain-proof: Yağmura karşı güvenli  
weather-proof: Havaya karşı güvenli  
water-tight: Su sızdırmaz  
submersible: Daldırılabilir  
ice resistant: Buza dayanıklı  
sleet resistant: Doluya dayanıklı  
corrosion resistant: Korozyona dayanıklı  
oil-tight: Yağ sızdırmaz

## KORUMA SINIFLARI • IP CLASSIFICATION

### Dokunmaya ve Yabancı Maddelere Karşı Koruma



İlk rakam	Koruma kapsamı	
	Tanım	Açıklama
0	Koruma yok.	Gerilim altında bulunan veya hareket eden bölümlere personelin tesadüfen dokunmasına karşı hiç bir koruma yok Elektrik ekipmanlarının yabancı madde girmesine karşı hiç bir koruma yok
 1	Ø 50 mm olan yabancı maddelere karşı koruma.	Gerilim altında bulunan veya hareket eden bölümlere personelin tesadüfen büyük alanda dokunmasına karşı örneğin; elle dokunmaya karşı koruma mevcut, ancak bilinçli olarak bu bölümlere ulaşmaya karşı koruma yok. Çapı 50 mm ve daha büyük olan katı yabancı cisimlerin girmesine karşı koruma.
 2	Ø 12, 5 mm olan yabancı maddelere karşı koruma.	Gerilim altında bulunan veya hareket eden bölümlere personelin parmakla dokunmasına karşı koruma mevcut. Çapı 12, 5 mm ve daha büyük olan katı yabancı cisimlerin girmesine karşı koruma.
 3	Ø 2, 5 mm olan yabancı maddelere karşı koruma.	Gerilim altında bulunan veya hareket eden bölümlere 2, 5 mm'den daha kalın alet, tel veya benzer cisimlerle dokunmaya karşı koruma mevcut. Çapı 2, 5 mm ve daha büyük olan katı yabancı cisimlerin girmesine karşı koruma.
 4	Ø 1 mm olan yabancı maddelere karşı koruma	Gerilim altında bulunan veya hareket eden bölümlere 1 mm'den daha kalın alet, tel veya benzer cisimlerle dokunmaya karşı koruma mevcut. Çapı 1 mm ve daha büyük olan katı yabancı cisimlerin girmesine karşı koruma.
 5	Toz toplanmasına karşı koruma	Gerilim altında bulunan veya hareket eden bölümlere dokunmaya karşı belirli bir koruma. Zararlı olabilecek toz toplanmasına karşı tam koruma. Toz girmesine karşı belirli bir koruma yok, fakat tozların cihazların işlevini aksatacak veya güvenilirliğini tehlikeye sokacak miktarda girmesi önlenmiştir.
 6	Toz girmesine karşı koruma, toz sızdırmaz.	Gerilim altında bulunan veya hareket eden bölümlere dokunmaya karşı tam koruma. Toz girmesine karşı koruma.

IP 4 4

Tanım harfi  
İlk rakam  
İkinci rakam

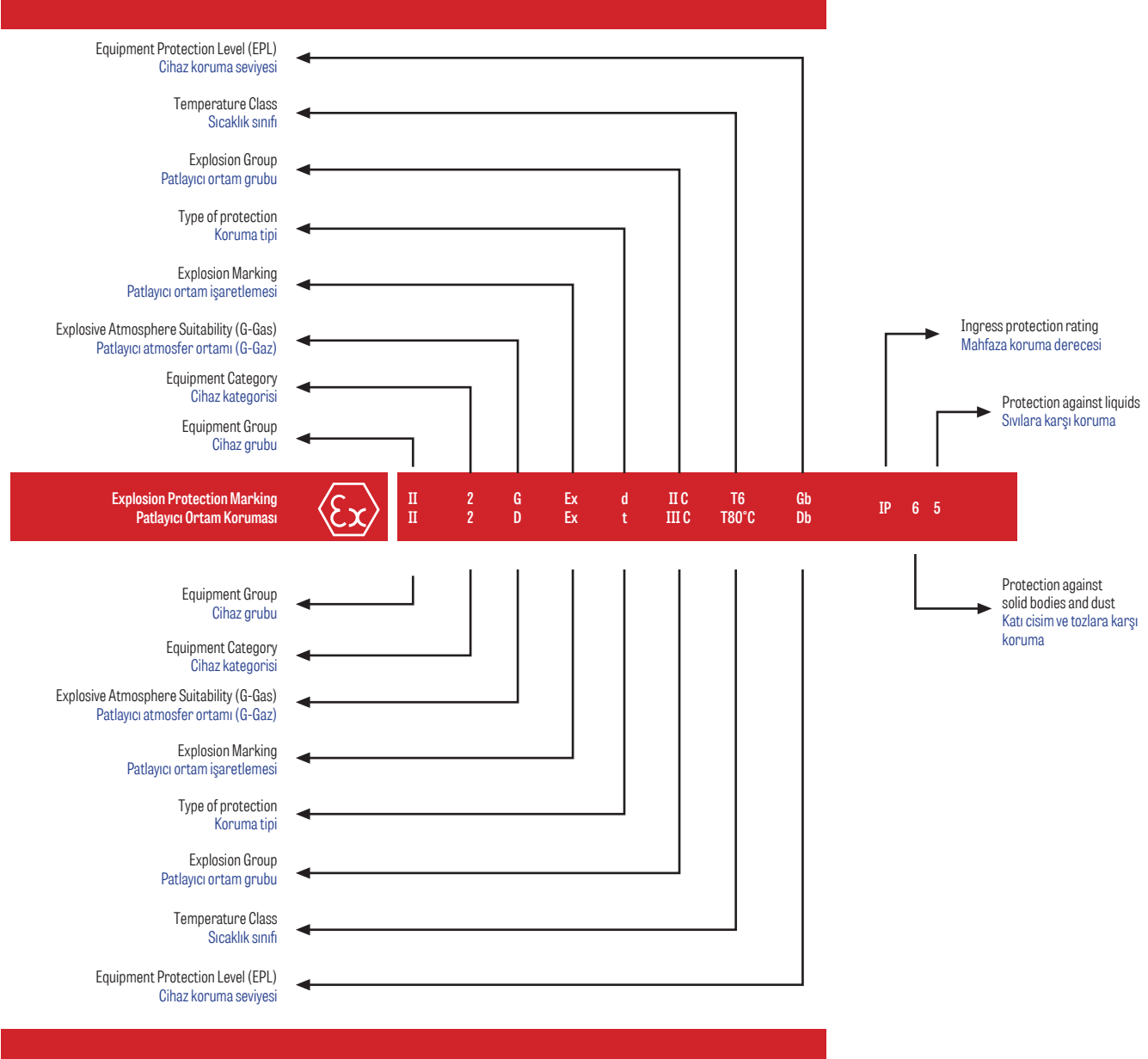
Koruma sınıfına ilişkin örnek

### Suya Karşı Koruma

İkinci rakam	Koruma kapsamı	
	Tanım	Açıklama
0	Koruma yok.	Belirli bir koruma yok.
 1	Düşey olarak yağın suya karşı koruma	Düşey olarak düşen su damlalarının hasara neden olmaması gerekir
 2	Mahfazaya 15° eğimle damlayan suya karşı koruma	Her iki tarafından 15° lik bir açı ile eğim verilmiş bir mahfazaya düşey olarak düşen su damlalarının zarar vermemesi gerekir.
 3	Mahfazaya 60° eğimle yağın yağmura karşı koruma	Her iki taraftan 60°'ye kadar olan her açıda düşey olarak akıtılan suyun zarar vermemesi gerekir.
 4	Fışkıran suya karşı koruma	Mahfazaya her taraftan püskürtülen suyun zarar vermemesi gerekir.
 5	Çok hızlı püskürtülen suya karşı koruma	İşletme ekipmanına bir memeden her yönde püskürtülen suyun zarar vermemesi gerekir.
 6	Çok hızlı ve kuvvetli püskürtülen suya karşı koruma	İşletme ekipmanına bir memeden kuvvetli olarak her yönden püskürtülen suyun zarar vermemesi gerekir.
 7	Zaman zaman suya daldırmaya karşı koruma	İşletme ekipmanı standartlaştırılmış koşullarda ve belirli sürede suya daldırıldığında zararlı olabilecek miktarda su girmemesi gerekir.
 8	Sürekli olarak suya daldırmaya karşı koruma	İşletme ekipmanı üretici ve kullanıcı arasında varılan mutabakatla tesbit edilmiş koşullarda sürekli olarak suya daldırıldığında zararlı olabilecek miktarda su girmemesi gerekir.
9	Yüksek basınçtaki suya/buhara karşı koruma	İşletme ekipmanı mahfazasına kuvvetli su basıncı doğrultulduğunda zararlı olabilecek kadar su girmemesi gerekir.



## EXPLOSION PROOF EQUIPMENT MARKING ALEV SIZDIRMAZ CİHAZ İŞARETLEMESİ



## HAZARDOUS LOCATIONS BASICS

### PATLAYICI ORTAMLAR TEMEL BİLGİLER

An explosive atmosphere is defined as a mixture of dangerous substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

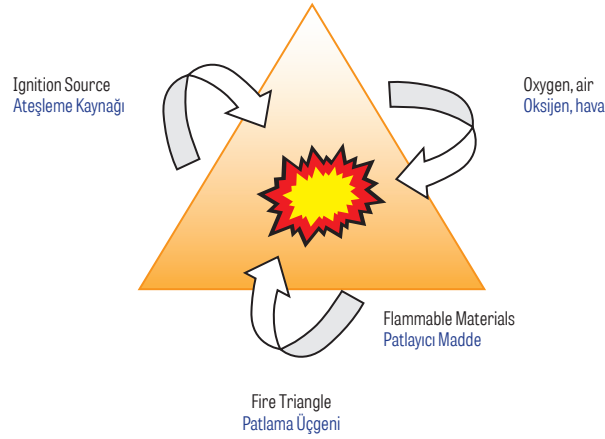
The three requirements for an explosion is represented in terms of the "Fire Triangle":

- Flammable gas, vapor or dust within certain limits of concentration
- Air containing a minimum concentration of oxygen
- An ignition source of minimum temperature and energy

Patlayıcı ortam, havanın patlayıcı, parlayıcı veya yanıcı özellikteki gaz, buhar, toz veya lif halindeki maddelerle karışımının patlama kıvamında bulunduğu ortamlardır.

Patlamanın oluşması için üç unsurun birarada olması gerekmektedir:

- Yanıcı/Parlayıcı/Patlayıcı madde (gaz, buhar, toz, lif)
- Oksijen (varolan atmosferik ortamdaki hava)
- Ateşleme Kaynağı (elektrik arkı, ısı, kıvılcım, alev)



Flammable gasses require only small amounts of energy to react with atmospheric oxygen such as a spark or hot surface. Therefore, the surface temperature of the mechanical and electrical equipment used is also of importance.

Flammable liquids change into vapour phase that forms a potentially explosive atmosphere near their surface. Depending on the properties of each liquid, the proportion of the liquid that has evaporated into the surrounding air is determined by the temperature of the liquid.

Flammable solids in the form of dust, fibre or flyings can react with atmospheric oxygen and produce significant explosions. Dust behaves differently depending on whether it is deposited as a layer or in a suspended as a dust cloud. Dust layers begin smouldering on hot surfaces, while a dust cloud can explode immediately through contact with a hot surface or by an ignition source.

In order to prevent the loss of life, serious injuries and significant damage explosions can cause, protective methods have been developed and defined in standards and regulations around the World.

In Turkey, "The Regulation on Equipment and Protective Systems to be Used in Potentially Explosive Environments (94/4/AT)" issued on 30.12.2006 via no. 26392 (4.rev) is in effect. This regulation is in parallel to the European Union Directive 94/9/EC (also known as 'ATEX 95' or 'the ATEX Equipment Directive') on the approximation of the laws of Members States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

Patlayıcı gazlar, havadaki oksijen ile karışımlarında kıvılcım gibi bir ateşleme kaynağı ile patlayabildikleri gibi ortamdaki aletlerin yüzey sıcaklıklarından da alev alabilirler, buna statik patlama adı verilir. Bu nedenle kullanılan elektrik ve mekanik teçhizatın yüzey sıcaklıklarına da dikkat edilmelidir.

Yanıcı sıvılar, sıvı halleri ile patlayıcı ortam oluşturmazlar. İçinde bulundukları ortamın sıcaklığına bağlı olarak buharlaşarak havadaki oksijen ile karışımlarında tehlike oluştururlar. Sıvıların patlayabilecek kıvamda sıvı buharı oluşturabilecekleri en düşük sıcaklık olan parlama noktası ve kaynama noktaları sıvıların tehlike derecelerini belirler.

Yanıcı Tozlar havadaki oksijen ile karışarak toz bulutu veya cihaz yüzeyinde ince tabaka halinde olabilir. Tozlar herhangi bir yüzeyde yerleşik iken dışarıdan ateşleme olmaksızın yüzey ısı ile korlanarak yanabilir veya patlayabilir. İnce tabaka halindeki tozların patlama sıcaklığı tozların havada bulut halinde iken alevlenme sıcaklığından düşüktür.

Endüstriyel ortamlarda can ve mal güvenliğini korumak için patlamalara karşı alınması gereken koruyucu önlemler dünyada çeşitli standartlar ve yönetmeliklerle belirlenmiştir.

Ülkemizde "Muhtemel Patlayıcı Ortamda Kullanılan Teçhizat ve Koruyucu Sistemler Yönetmeliği (94/4/AT)" 30.12.2006 tarih ve 26392 (4.Mük.) sayılı Resmi Gazetede yayınlanarak alınması gereken önlemler belirlenmiş ve uyulması zorunlu hale getirilmiştir.

The two widely used ways of reducing the risk of explosion is preventing release of dangerous substances to avoid creation of explosive atmospheres, and in potentially explosive atmospheres, preventing sources of ignition by using Ex-Proof Equipment

Buna göre, havalandırma ve benzeri birincil önlemlerle patlayıcı ortamın oluşması önlenemiyorsa, oluşan Tehlikeli Bölgelerde tehlikesiz çalışabilecek Alevsizdirmaz (ex-proof) ekipman kullanarak patlayıcı ortamın tutuşması önlenmelidir.

Tehlikeli (Patlayıcı) Ortamlar, normal koşullarda oluşma ihtimali, oluşma sıklığı ve bu ortamın devam etme süresi esas alınarak, yukarıda Tablo.1'de görüldüğü gibi sınıflandırılmıştır.

Table 1. Zone Classification - Tablo 1. Kuşak Sınıflandırması

ZONE KUŞAK		Probability of a potential explosive atmosphere occurring Normal çalışma koşullarında patlayıcı ortam bulunma ihtimali
Gas Gaz	Dust Toz	
0	20	Continuous presence - Sürekli veya uzun süreli bulunduğu yerler
1	21	Intermittent presence - Bazen, düzensiz ve kısa süreli olduğu yerler
2	22	Occasional presence - Normalde ihtimali olmayan, patlayıcı ortamın kazara, kısa süreler için oluşabileceği yerler

Equipment Group Cihaz Grubu	Equipment Category Cihaz Kategorisi	Explosion Group Patlayıcı ortam grubu	EPL Cihaz koruma seviyesi	Zones Kuşaklar
I	M1	I	Ma	YOK/NA
	M2		Mb	
II	1G	IIA IIB IIC	Ga	0
	2G		Gb	1
	3G		Gc	2
	1D	IIIC	Da	20
	2D		Db	21
	3D		Dc	22

Hazardous explosive atmospheres are classified into zones as seen in Table.1 based on its size and location, the likelihood of an explosive atmosphere occurring, and its persistence if it does. The classification of potentially explosive hazardous areas must be determined by the employers, working together with experts on this subject.

Explosive atmospheres are classified as seen in Table.2, based on the characteristics of flammables present.

Dünyada veya ülkemizde tehlikeli alanlarda Ortam Sınıflandırması belirleyen bir otorite yoktur, işletme sahibi, tesisin yer ve büyüklüğü, patlayıcı ortamın oluşma olasılığı ve sürekliliği gibi kriterleri göz önüne alarak, konusunda uzman mühendisler ile tehlikeli bölgeleri tanımlamalıdır.

Patlayıcı ortamlar, bulunan yanıcı maddelerin özellikleri göz önüne alınarak aşağıdaki Tablo.2'de görüldüğü gibi gruplanmıştır.

Table 2. Explosive Atmosphere Groups - Tablo 2. Patlayıcı Ortam Grupları

Explosive Atmospheres Patlayıcı Ortam	Explosion Group Patlayıcı Ortam Grubu	Typical Hazardous Material Örnek Tehlikeli Ortam
Underground Coal Mines Tüm Yeraltı kömür madenleri	I	Natural Methane (Grizu) Doğal Metan (Grizu)
Hazardous Areas Other than Underground Coal Mines - Kömür Madeni Dışındaki Ortamlar		
Gases and Vapors Gazlar ve buharlar	IIA	Propane Propan
	IIB	Ethylene Etilen
	IIC	Acetylene, Hydrogen Asetilen, Hidrojen
Lifler Fibres & Flyings	IIIA	Wood, paper or cotton processing Ağaç, kağıt veya pamuk işleme
Dusts Tozlar	IIIB	Grain dust Tahıl tozu
	IIIC	Metal dust, coal dust Metal tozu, kömür tozu

## HAZARDOUS LOCATIONS BASICS

### PATLAYICI ORTAMLAR TEMEL BİLGİLER

Only explosion protected equipment may be used in areas that are potentially explosive. Different types of protection methods are used in electrical explosion protected equipment according to standards and regulations, as outlined in Table-3.

Patlayıcı ortamlarda çalışacak cihazlar, ateşleme kaynağı olma tehlikesini ortadan kaldırmak için değişik yöntemlerle koruma altına alınarak güvenli hale getirilirler. Koruma tipleri cihazların mahfazaları, tüm giriş ve çıkışları, kumanda tertipleri ile eleman ve bağlantılarını kapsar. Standartlarca belirlenmiş koruma tipleri Tablo. 3'te gösterilmiştir.

Table 3. Equipment Protection Types - Tablo 3. Cihaz Koruma Tipleri

Rating İşaret	Description	Cihaz koruma sınıfı	Description	EPL Equipment protection level
Gazlar İçin		For Gases		
d	Aleve karşı korumalı mahfaza	Gb veya Mb	Flameproof enclosure	Gb or Mb
e	Artırılmış güvenlik	Gb veya Mb	Increased safety	Gb or Mb
ia	Kendinden güvenlik	Ga veya Ma	Intrinsic safety	Ga or Ma
ib	Kendinden güvenlik	Gb veya Mb	Intrinsic safety	Gb or Mb
ic	Kendinden güvenlik	Gc	Intrinsic safety	Gc
ma	Kapsül içine alınmış	Ga veya Ma	Encapsulation	Ga or Ma
mb	Kapsül içine alınmış	Gb veya Mb	Encapsulation	Gb or Mb
mc	Kapsül içine alınmış	Gc	Encapsulation	Gc
nA	Kıvılcım çıkartmaz	Gc	Non-sparking	Gc
nC	Kıvılcım koruma	Gc	Protected sparking	Gc
nR	Nefes almayı kısıtlama	Gc	Restricted breathing	Gc
nL	Enerji sınırlandırma	Gc	Energy limited	Gc
o	Yağa daldırma,	Gb	Oil immersion	Gb
px	Basınç altına alınma	Gb veya Mb	Pressurization	Gb or Mb
py	Basınç altına alınma	Gb	Pressurization	Gb
pz	Basınç altına alınma	Gc	Pressurization	Gc
q	Toz doldurma.	Gb veya Mb	Powder filling	Gb or Mb
Tozlar İçin		For Dust		
ta	Mahfaza ile koruma	Da	Protection by enclosure	Da
tb	Mahfaza ile koruma	Db	Protection by enclosure	Db
tc	Mahfaza ile koruma	Dc	Protection by enclosure	Dc
ia	Kendinden güvenlik	Da	Intrinsic safety	Da
ib	Kendinden güvenlik	Db	Intrinsic safety	Db
ic	Kendinden güvenlik	Dc	Intrinsic safety	Dc
ma	Kapsül içine alınmış	Da	Encapsulation	Da
mb	Kapsül içine alınmış	Db	Encapsulation	Db
mc	Kapsül içine alınmış	Dc	Encapsulation	Dc
p	Basınç altına alınma	Db veya Dc	Pressurization	Db or Dc



The maximum allowable temperature classes (or maximum surface temperature of apparatus in case of dust) of potentially explosive areas considering explosive properties and safety factors are outlined in Table-4.

Yanıcı maddelerin patlama sıcaklıklarına göre, güvenlik faktörleri de göz önüne alınarak, patlamaların önlenmesi için tehlikeli ortamlarda bulunması gereken en yüksek yüzey sıcaklıkları da yukarıda Tablo.4'te görüldüğü şekilde sınıflandırılmıştır. Tozlar için belirlenmiş en yüksek yüzey sıcaklığı "T85°C" şeklinde ölçülen değerin kendisi ile ifade edilir.

Table 4. Temperature Classification - Tablo 4. Sıcaklık Sınıfları

Temperature Class	Ignition Temperature of The Flammable Substances in °C	Max. Surface Temperature of Aparatus in °C	Typical Hazardous Material
Sıcaklık Sınıfı	Tehlikeli Ortamın Patlama Sıcaklığı (°C)	En Yüksek Yüzey Sıcaklığı (°C)	Örnek Gazlar
T1	> 450	450	Methane, propane, hydrogen etc. Metan, propan, hidrojen, vb.
T2	> 300 ≤ 450	300	Ethylene, acetylene, ethyl alcohol etc. Etilen, asetilen, etil alkol, vb.
T3	> 200 ≤ 300	200	Oil, diesel etc. Petrol, mazot , vb.
T4	> 135 ≤ 200	135	Ethyl ether Etil eter
T5	> 100 ≤ 135	100	Phosphamine Phosphine
T6	> 85 ≤ 100	85	Carbon disulfide Karbon disülfür

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SAPPHIRE, LEVENT - İSTANBUL



WATER GARDEN, ATAŞEHİR - İSTANBUL

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- İŞ KULELERİ, LEVENT - İSTANBUL
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- TEKFEN TOWER, LEVENT - İSTANBUL
- METRO CITY, LEVENT - İSTANBUL
- ECZACIBAŞI KANYON AVM & RESIDENCE, LEVENT - İSTANBUL
- AMERİKAN KONSOLOSLUK BİNASI, POLİGON - İSTANBUL
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- İSTİNYE PARK, MASLAK - İSTANBUL
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- 212 İSTANBUL AVM, BAKIRKÖY - İSTANBUL
- OPTİMUM AVM, ATAŞEHİR - İSTANBUL
- PALLDIUM AVM, ATAŞEHİR - İSTANBUL
- İSTANBUL SAPPHIRE, LEVENT - İSTANBUL
- MARMARA FORUM AVM, BAKIRKÖY - İSTANBUL
- FORUM İSTANBUL AVM, BAYRAMPAŞA - İSTANBUL
- MALL OF İSTANBUL, BAŞAKŞEHİR - İSTANBUL
- RINGS AVM, SANCAKTEPE - İSTANBUL
- EMAAR SQUARE AVM, ÜSKÜDAR - İSTANBUL
- FİNANSBANK GENEL MÜDÜRLÜK (KRİSTAL TOWER), LEVENT - İSTANBUL
- CANPARK AVM VE HİLTON OTEL, ÜMRANİYE - İSTANBUL
- RÖNESANS TOWER, ATAŞEHİR - İSTANBUL
- İZMİR OPTİMUM AVM, GAZİEMİR - İZMİR
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- WATER GARDEN AVM PROJESİ - ATAŞEHİR
- EGE PERLA AVM, İZMİR





AVRASYA TÜNELİ - İSTANBUL



EGEGAZ LNG TERMINAL, ALİAĞA-İZMİR



TÜPRAG KIŞLADAĞ ALTIN MADENİ



510MW KOLİN SOMA TERMİK SANTRALİ - MANİSA



ENKA GEBZE DOĞALGAZ ÇEVİRİM SANTRALİ - KOCAELİ

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- ZENIUM İSTANBUL VERİ MERKEZİ, ÜMRANİYE - İSTANBUL
- BAKÜ-TİFLİS-CEYHAN BORU HATTI, CEYHAN - ADANA
- ANKARA METROSU, TÜM İSTASYONLAR
- KADIKÖY KARTAL METRO HATTI, TÜM İSTASYONLAR
- YENİKAPI - HACIOSMAN METRO HATTI, TÜM İSTASYONLAR
- MARMARAY, CR1 AYRILIK ÇEŞME - YENİKAPI, GEÇİT ve İSTASYONLAR
- AVRASYA TÜNELİ
- KIRIKKALE ACWA GÜÇ CCPP ENERJİ SANTRALİ, KIRIKKALE
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- AIRPORT CARGO TERMINAL, BAKU - AZERBAIJAN
- MISIÓN VIVIENDA PUBLIC HOUSING, CARACAS - VENEZUELA
- NEW US EMBASSY COMPOUNDS, COLOMBO - SRI LANKA, KABUL - AFGHANISTAN, MOSCOW - RUSSIA, THE HAGUE - HOLLAND, ASHGABAT - TURKMENISTAN, SANTA DOMINGO - DOMINICAN REPUBLIC, FREETOWN - SIERRA LEONE, BAMAKO - MALI, SANA - YEMEN, ASUNCION - PARAGUAY, M'APUTO - MOZAMBIQUE, HARAMOUS - DJIBOUTI, KATHMANDU - NEPAL, ALGIERS - ALGERIA
- NEW US CONSULATE COMPOUNDS, HYDERABAD - INDIA, DHAHRAN - SAUDI ARABIA
- US MILITARY INSTALLATIONS DURING OPERATION IRAQI FREEDOM, IRAQ
- ISAF INSTALLATIONS DURING NATO LED WAR, AFGHANISTAN
- MISSILE DEFENSE FACILITY, DEVESELU BASE - ROMANIA
- LOGISTICS CIVIL AUGMENTATION PROGRAM (LOGCAP )
  - PHASES I-II-III, IRAQ - KBR
  - PHASE IV, AFGHANISTAN - FLUOR, DYNCORP & KBR

## INDUSTRIAL PROJECTS • ENDÜSTRİYEL PROJELER

- 300 MW SAMRA COMBINED CYCLE POWER PLANT, AL SAMRA - JORDAN
- 400 MW TYNAGH CCGT POWER PLANT, GALWAY - IRELAND
- 450 MW WHITEGATE COMBINED CYCLE POWER PLANT, CORK - IRELAND
- RIGA TPP 2 COMBINED CYCLE POWER PLANT, RIGA - LATVIA
- 800 MW COMBINED CYCLE POWER PLANT, SURGUT - RUSSIA
- 411 MW COMBINED CYCLE POWER PLANT, YAJVA - RUSSIA
- 750 MW COMBINED CYCLE POWER PLANT, SAMAWA - IRAQ
- 1,500 MW COMBINED CYCLE POWER PLANT, BESMAYA - IRAQ
- 1,500 MW COMBINED CYCLE POWER PLANT, SULAYMANIYAH - IRAQ
- 1,500 MW COMBINED CYCLE POWER PLANT CONVERSION, ERBIL - IRAQ
- WEST QURNA-2, GAS TREATMENT, POWER GENERATION & DISTRIBUTION, IRAQ
- KASHAGAN OIL FIELD DEVELOPMENT, KAZAKHSTAN
- SAKHALIN ONSHORE PROCESSING FACILITY, SAKHALIN - RUSSIA
- RUMALIA OPEN CYCLE GAS POWER PLANT, BASRA - IRAQ
- AL-MUSSAIB THERMAL POWER PLANT, BABIL - IRAQ
- TAJI - 1&2, OPEN CYCLE GAS POWER PLANTS, BAGHDAD - IRAQ
- TAZA OPEN CYCLE GAS POWER PLANT, KIRKUK - IRAQ
- SOUTH BAGHDAD 1&2, OPEN CYCLE GAS POWER PLANTS, BAGHDAD - IRAQ
- BESMAYA CCGP, BAGHDAD - IRAQ

The image displays three certificates of compliance and ISO 9001:2008 certification. The top-left certificate is from TCS (API ELEKTROBİNAKLIK VE ELEKTRONİK SAN. TİC. LTD. ŞTİ.) and certifies ISO 9001:2008. The top-right certificate is from UL (ELECTROLINE FITTINGS L.L.C.) and certifies Electrical Metallic Tubing. The bottom certificate is from UL (ELECTROLINE FITTINGS COMPANY™) and certifies Conduit, Tubing, and Cable Fittings, UL 514B. The certificates are arranged in a collage, with the UL certificates overlapping the TCS certificate.





ISO 14001:2004



OHSAS 18001:2007



ISO 9001:2008

CERTIFICATE OF COMPLIANCE

Certificate Number 20131224-E358462  
Report Reference E358462-20121026  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that representative samples of Metallic Outlet Boxes  
See following page for list of models

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Metallic Outlet Boxes, UL 514A  
Cover Plates for Flush-Mounted Wiring Devices, UL 514D

Additional Information: See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle, ® with the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney  
William R. Carney, Director, North American Certification Programs  
UL LLC  
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CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358458  
Report Reference E358458-20121018  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that representative samples of Electrical Metallic Tubing  
E-EMT 50L, E-EMT 75L, E-EMT 100L, E-EMT 125L,  
E-EMT 150L, E-EMT 200L

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Electrical Metallic Tubing – Steel, UL 797

Additional Information: See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle, ® with the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney  
William R. Carney, Director, North American Certification Programs  
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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358456A  
Report Reference E358456-20121018  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US  
Tradename: ELECTROLINE FITTINGS COMPANY™


This is to certify that  
representative samples of CONDUIT AND CABLE HARDWARE  
See Addendum Page

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Hardware for the Support of Conduit, Tubing, and Cable,  
UL 2239

Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle,  with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

  
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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358456B  
Report Reference E358456-20121031  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US  
Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of Conduit and Cable Hardware  
EMT One-Hole Straps: E-L 650, E-L 651, E-L 652, E-L  
653, E-L 654, E-L 655, E-L 606T, E-L 607T, E-L 609T.

EMT Two-Hole Straps: E-L 660-1, E-L 660-2, E-L 660-3,  
E-L 660-4, E-L 660-5, E-L 660-6, E-L 620-7, E-L 620-8,  
E-L 620-10


Models continued on following page.

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Hardware for the Support of Conduit, Tubing, and Cable,  
UL 2239

Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle,  with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

  
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contact a local UL Customer Service Representative at [info@ul.com](mailto:info@ul.com)

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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358457A  
Report Reference E358457-20121109  
Issue Date 2013-DECEMBER-23


Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US  
Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of CONDUIT FITTINGS  
Please see models on following page

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Conduit, Tubing, and Cable Fittings, UL 514B  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle,  with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

  
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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358457B  
Report Reference E358457-20121024  
Issue Date 2013-DECEMBER-23


Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US  
Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of CONDUIT FITTINGS  
Entrance ELLS: E-L 900, E-L 901, E-L 902, E-L 903

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 514B Conduit, Tubing and Cable Fittings  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle,  with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

This is to certify that representative samples of the product as specified on this certificate were tested  
according to the current UL requirements.

  
William R. Carey, Director, North American Certification Programs  
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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223E358459A  
Report Reference E358459-20121017  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of Electrical Metallic Tubing Fittings  
See following page for list of models

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Conduit, Tubing, and Cable Fittings, UL 514B  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle, ® with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

*William R. Carey*  
William R. Carey, Director, North American Certification Programs  
UL LLC

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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358459B  
Report Reference E358459-20121031  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of Electrical Metallic Tubing Fittings  
See following page for list of models

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Conduit, Tubing, and Cable Fittings, UL 514B  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

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William R. Carey, Director, North American Certification Programs  
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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358460  
Report Reference E358460-20121018  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of Nonmetallic-sheathed-cable Connectors  
Nonmetallic-sheathed cable fittings: E-L 51, E-L 104A,  
E-L 105, E-L 106, E-L 107

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Conduit, Tubing, and Cable Fitting, UL 514B  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
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The UL Listing Mark generally includes the following elements: the symbol UL in a circle, ® with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

*William R. Carey*  
William R. Carey, Director, North American Certification Programs  
UL LLC

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## CERTIFICATE OF COMPLIANCE

Certificate Number 20131223-E358461  
Report Reference E358461-20121018  
Issue Date 2013-DECEMBER-23

Issued to: ELECTROLINE FITTINGS L L C  
SUITE 106  
110 HARMON DR  
BLACKWOOD , NJ 08012  
US

Tradename: ELECTROLINE FITTINGS COMPANY™

This is to certify that  
representative samples of Armored Cable Connectors, Type AC  
For armored cables (Type AC), armored cable, metal clad  
cable and flexible metal conduit: E-L 110, E-L 110-1,  
E-L 110-2, E-L 42, E-L 42-1, E-L 42-2, E-L 67, E-L 58,  
E-L 57

See next page for additional models

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

Standard(s) for Safety: Conduit, Tubing, and Cable Fittings, UL 514B  
Additional Information: See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's  
Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle, ® with the  
word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category  
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Look for the UL Listing Mark on the product.

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William R. Carey, Director, North American Certification Programs  
UL LLC

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In order to expedite the export orders, we utilize our Free Zone warehouse in Tuzla where we keep the majority of our inventory.

İthalat/İhracat işlemlerimizi hızlı ve verimli bir şekilde, Tuzla Serbest Bölge şubemiz üzerinden yapmaktayız.

İç/Dış Sıcak Daldırma Galvanizli EMT Boru



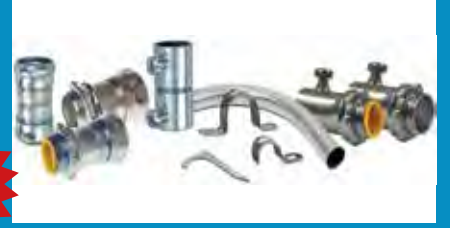
**SADECE**  
AFİ Elektrik  
stoklarında

İç/Dış Sıcak Daldırma Galvanizli RSC Boru



**SADECE**  
AFİ Elektrik  
stoklarında

EMT Boru Aksesuarları



RSC Boru Aksesuarları



Boru Paketleme



Alüminyum Kondüetler



Dahili Tip Çelik Buatlar



Harici Tip Alüminyum Buatlar



Spiral Boru ve Aksesuarları



## STOKLU ÜRÜNLERİMİZ

### Dışsız EMT Boru

- İç/Dış Sıcak Daldırma Galvaniz

### Dışsız EMT Boru Aksesuarları

- Zamak
- Çelik

### Dişli RSC Boru

- İç/Dış Sıcak Daldırma Galvaniz

### Dişli RSC Boru Aksesuarları

- Pik Döküm
- Çelik

### Dahili Tip Çelik Buatlar

### Harici Tip Alüminyum Buatlar

### Alüminyum Kondüetler

### Boru Bükme Aparatları

### Kablo Çekme Sabunları

### Eksproof Ürünler

- Aydınlatma Armatürleri
- Fiş/Priz Takımları
- Kontrol Ekipmanları
- Şalt Malzeme
- Kablo Rakorları

## KABLO KORUMA VE SONLANDIRMA SİSTEMLERİNDE ENDÜSTRİ LİDERİ

Firmamız, **ELECTROLINE** firmasının stoklu çalışan tek yetkili distribütörüdür.

[www.electroline.us](http://www.electroline.us)

