



**CONNECT AND PROTECT**

# nVent ERIFLEX Flexibar

Technical handbook

  
nvent

**ERIFLEX**

In accordance with its policy of continuous improvement, the Company reserves the right to change specifications and designs without notice. All illustrations, descriptions, dimensions and weights in this catalogue are for guidance and cannot be held binding on the Company.

# Table of Content

<b>What is nVent ERIFLEX Flexibar? .....</b>	<b>4</b>	<b>Recommended Fabrication Procedures.....</b>	<b>29</b>
<b>Flexibar benefits .....</b>	<b>5</b>	• General Design Guide - Fabricated Parts .....	29
<b>Applications.....</b>	<b>7</b>	• Safety .....	29
<b>Main Technical Specifications .....</b>	<b>8</b>	• Cutting .....	30
<b>Flexibar Selection .....</b>	<b>9</b>	• Bending.....	30
• Selection of Flexibar according to the internal temperature of the panel.....	9	• Twisting.....	31
• How Sizing conductors.....	9	• Folding .....	31
• Temperature rise of the conductor.....	9	• Stripping .....	32
• Flexibar in parallel.....	9	• Cut Finishes.....	32
<b>IEC Ampacities.....</b>	<b>10</b>	• Drilling / Punching.....	33
<b>UL Ampacities.....</b>	<b>11</b>	• Fabrication Steps order.....	34
<b>nVent ERIFLEX Flexibar Advanced UL &amp; CSA Certification .....</b>	<b>12</b>	• Connecting.....	34
<b>Skin Effect on Alternative Current Application.....</b>	<b>13</b>	• Flexibar Connection on MCCB.....	35
<b>Current Density .....</b>	<b>14</b>	• Accessories and solutions for connection.....	36
<b>Skin Effect and Frequency .....</b>	<b>15</b>	• Flexibar Direct connection on power & distribution blocks.....	39
<b>Power Dissipation .....</b>	<b>16</b>	• Fixing/Securing.....	42
<b>Thermal Short-Circuit Strength .....</b>	<b>17</b>	• Accessories and solution for Fixing/Securing .....	45
<b>Flexibility: Innovative Patent Insulation .....</b>	<b>18</b>	<b>Recommended Fabrication Procedures .....</b>	<b>46</b>
<b>Flexibility and Bending Radius Comparison with Cable.....</b>	<b>19</b>	<b>Fixing and Securing nVent ERIFLEX Flexibar Advanced.....</b>	<b>47</b>
<b>Class II Insulation .....</b>	<b>20</b>	<b>Recommended Fabrication Tools.....</b>	<b>48</b>
<b>Wrinkle on Insulation .....</b>	<b>22</b>	<b>Made to Order Solutions (MTO) .....</b>	<b>56</b>
<b>Altitude Effect.....</b>	<b>22</b>	<b>Applications Pictures.....</b>	<b>57</b>
<b>Halogen-Free (HF) .....</b>	<b>22</b>	<b>nVent Eriflex Software .....</b>	<b>60</b>
<b>Low Smoke (LS) .....</b>	<b>23</b>	<b>Other nVent ERIFLEX Literature .....</b>	<b>61</b>
<b>Flame Retardant (FR) .....</b>	<b>23</b>	<b>Contact us!.....</b>	<b>64</b>
<b>EN 45545-2 Fire Testing to Railway Components.....</b>	<b>24</b>		
<b>Certifications for Marine &amp; Offshore.....</b>	<b>25</b>		
<b>How to Achieve a Good Electrical Connection .....</b>	<b>26</b>		
• Contact surface conditions.....	26		
• Contact surface (S) - Overlap.....	26		
• Necessary Clamping Force (F).....	26		
• Clamping torque calculation .....	27		
• Two Ways to Connect FLEXIBAR in Parallel:.....	28		
• Flexibar Connected to an Electrical device: .....	28		

# What is nVent ERIFLEX Flexibar?

Flexibar can be used for making power connections on devices or for creating links that can be adapted to any requirement. Guaranteeing safety and high quality finish, they provide an undeniably attractive touch.

Based on the most commonly used sizes and the electrical capacities of the usual nominal values, the Flexibar range of flexible bars is suitable for most connection or linking requirements.

Flexibar consists of pure electrolytic copper (tinned or plain) layers within a protective self-extinguishing sleeve.

- **Flexibar Advanced:**  
TPE Compound (halogen-free, Flame retardant, Low Smoke and 115°C)
- **Flexibar Standard:**  
PVC Compound (Flame retardant and 105°C)
- **Flexibar Summum:**  
Silicon Compound (halogen-free, flame retardant and 280°C)

The individual layers slide smoothly against one another allowing the Flexibar to be easily shaped to fit a wide range of panel layouts.

The insulating sleeve is grooved on the inner surface, reducing the contact surface with the laminates to less than 20%, increasing flexibility and making installation easier. It also helps releasing constraint on insulation, improving safety and reliability.

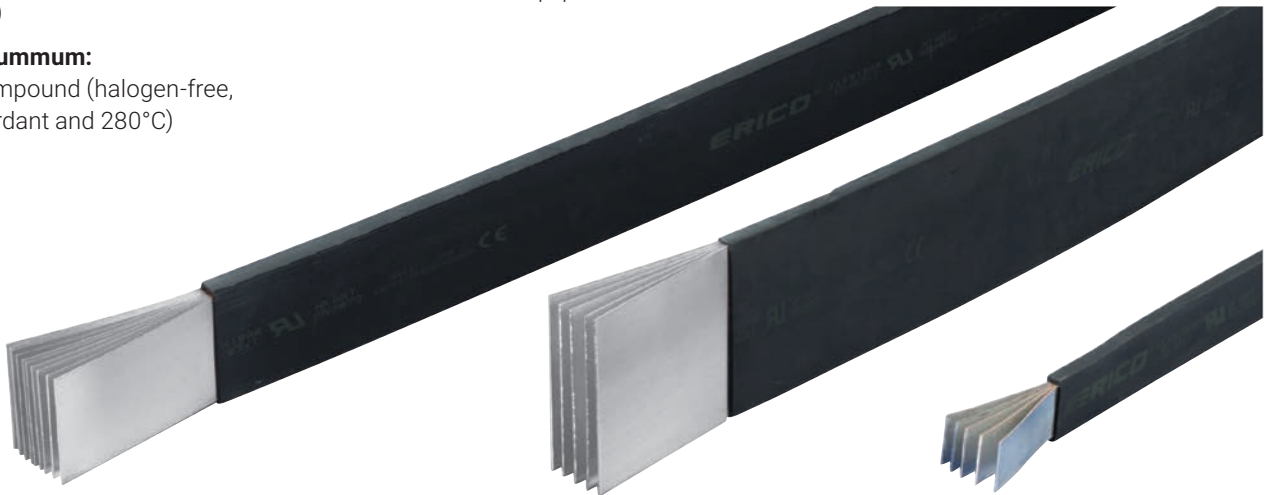
Easily formed even in its largest size, Flexibar vastly improves design and assembly flexibility and the aesthetic of finished panels. All Flexibar cross sections can be bended, folded, or twisted with a very small bending radius for shorter and more compact power connections between main power and distribution equipment, between

transformers and busduct, between busduct and electrical cabinets, and many other types of connections.

When compared to standard round cable, Flexibar offers space saving advantages due to a tighter bend radius and the ability to replace multiple round conductors with a single piece of Flexibar.

Modification of fewer conductors and the elimination of ring terminals can result in significant cost and labor reduction.

Flexibar is a flexible busbar wire replacement solution for low voltage applications available from 19.5 mm<sup>2</sup> up to 1200 mm<sup>2</sup> and 125 A to 2800 A with a single conductor per phase or up to 4500A with 3 conductors per phase.



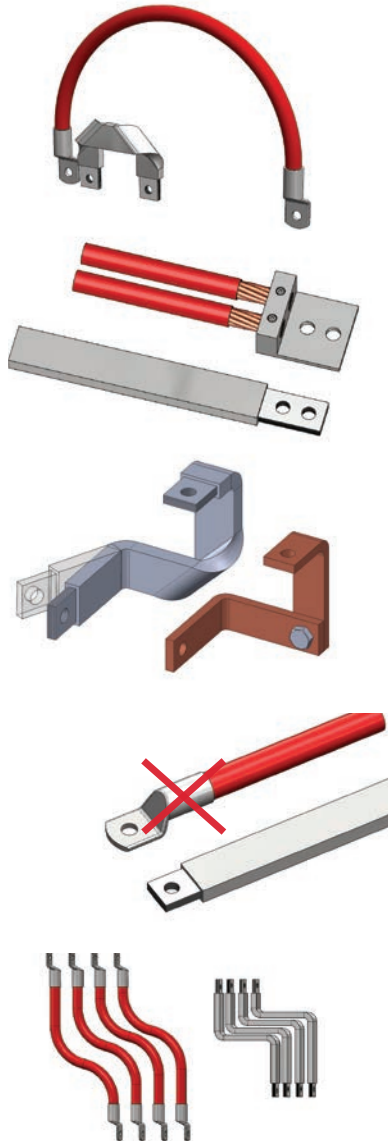
# Flexibar Benefits

## SPACE AND WEIGHT

- Flexibar require less wire bending space than cable.
- With greater ampacities, a single piece of Flexibar can replace multiple runs of cable.
- Protective sleeve allows Flexibar to be mounted in tight areas where rigid busbar could not be used.
- No clearance distance needed around Flexibar vs other phases or metallic parts.
- No need to add insulation in case of short clearance distance (ex: rigid busbar with epoxy insulation coating).

## TIME

- Eliminates the need for lugs which reduces installation time and cost.
- Can replace rigid busbar designs eliminating the time spent engineering and fabricating rigid busbar.
- Easier to bend and shape than large cables, so installation is quicker.



## OPERATING

- Ring terminals are no longer needed. Simply punch or drill through the exposed end of the Flexibar to bolt to device.
- Higher working temperature than usual cables allows dealing with the potential hot connecting point from the electrical devices.

## AESTHETIC

- Increases design flexibility.
- Neatly organizes hard-to-make connections.

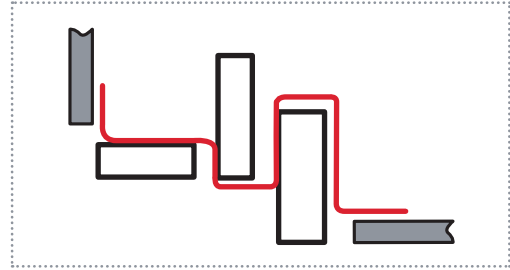
## RELIABILITY

- Flexibar is directly connected thus eliminating the cable lug connection and other source of heating point.
- Excellent resistance to vibration.
- No crimping.
- Less human error.

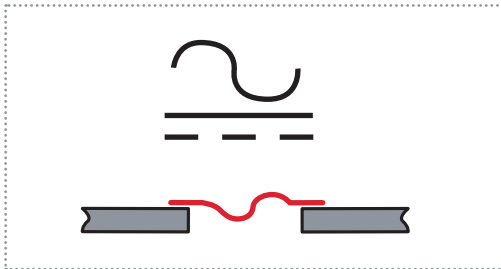
# Flexibar Benefits



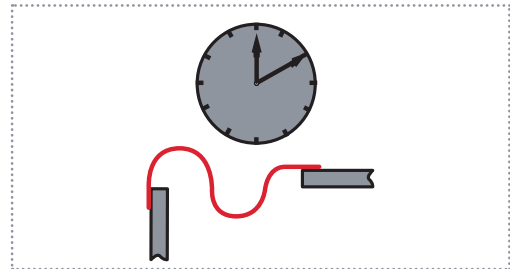
Worldwide certifications, applications and product availability



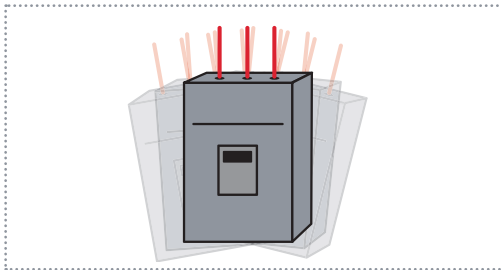
Easy connection for specific applications



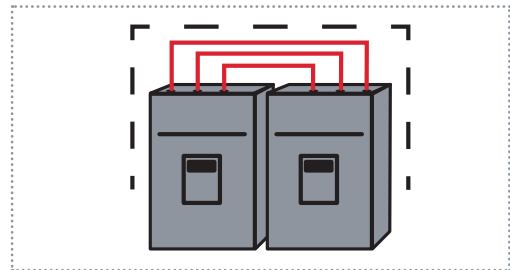
Connections for alternating current or direct current application



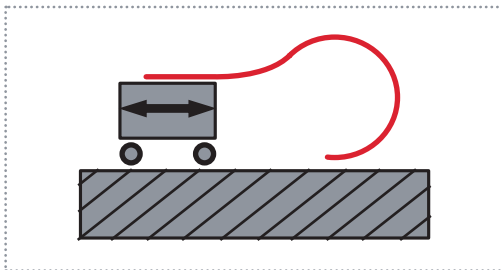
Reduces assembly time and maintenance connection



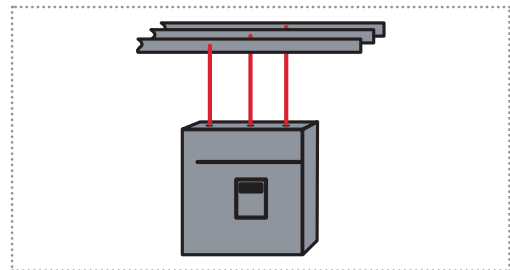
Reliable protection against vibrations in power connections



Short and compact connection between electrical components for volume reduction



Flexible connection between fixed and moving parts



Busbar and active electrical component connection (Example: circuit breaker, contactor) including the most compact components on the market

# Applications



**ENERGY**



**INDUSTRY & BUILDINGS**



**PANELBOARD**



**TRANSPORTATION**




**MACHINERY**

- Low Voltage Power Distribution and Control Applications
- Busbar Systems
- Motor Control Centers
- Drive Systems
- Switchboards
- Transformers

- Panelboards
- Control Panels
- Power Supplies
- Electrical Machinery
- UPS Systems
- Electrical Vehicle

# Main Technical Specifications

	Flexibar Advanced	Flexibar Standard	Flexibar Summum
<b>Finish:</b>	Tinned	Tinned or Plain	Plain
<b>Material:</b>	Electrolytic copper Cu-ETP 99,9% purity Thermoplastic Elastomer	Electrolytic copper Cu-ETP 99,9% purity Polyvinylchloride	Electrolytic copper Cu-ETP 99,9% purity Silicone
<b>Maximum resistivity at 20°C</b>	0.017241 ohms.mm <sup>2</sup> / m		
<b>Dielectric strength:</b>	20 kV/mm		
<b>Flammability rating:</b>	UL 94-V0 and IEC 60695-2-11 (Glow Wire Test 960 °C)		
<b>Halogen-free rating:</b>	UL® 2885 IEC® 60754-1 IEC® 62821-2	-	IEC® 60754-1 IEC® 62821-2
<b>Low smoke rating:</b>	IEC® 61034-2 UL 2885 ISO 5659-2	-	-
<b>UV Rating:</b>	UL 2556 and UL 854	-	-
<b>Typical Insulation Elongation:</b>	> 500%	> 370%	> 400%
<b>Typical Insulation Thickness:</b>	1.8 mm (0,070 inches)	2 mm (0,078 inches)	2 mm (0,078 inches)
<b>Nominal Voltage:</b>	UL/CSA/IEC: 1,000 VAC; 1,500 VDC	UL/CSA/IEC: 1,000 VAC; 1,500 VDC	IEC: 1,000 VAC; 1,500 VDC
<b>Working Temperature:</b>	-50 to <b>115°C</b> (-58 to 239°F)	-50 to 105°C (-58 to 221°F)	-50 to 280°C (-58 to 536°F)
<b>Certification Details:</b>	UL® 67 UL® 758 CSA 90005	UL® 67 UL® 758 CSA 90005	-
<b>Complies With:</b>	IEC® 60695-2-11 (Glow Wire Test 960°C) IEC® 61439.1 IEC® 61439.1 Class II CE RoHS EN 45545: HL2 classification Bureau Veritas (Marine & Offshore) EAC ABS American Bureau of Shipping	IEC® 60695-2-11 (Glow Wire Test 960°C) IEC® 61439.1 IEC® 61439.1 Class II ABS American Bureau of Shipping Bureau Veritas (Marine & Offshore) CE EAC RoHS	IEC® 61439.1 ABS American Bureau of Shipping CE EAC RoHS EN 45545: HL3 classification for chapters R22 & R23

 See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) for last data update and certification documents



# Flexibar Selection

## SELECTION OF FLEXIBAR ACCORDING TO THE INTERNAL TEMPERATURE OF THE PANEL

When sizing a conductor, the air temperature around the conductor is a very important parameter. It's affected by convection type, protection level of enclosure, the temperature rise, etc. Based on IEC 61439 standards, the ambient air temperature do not exceed +40°C and its average over a period of 24h does not exceed +35°C.

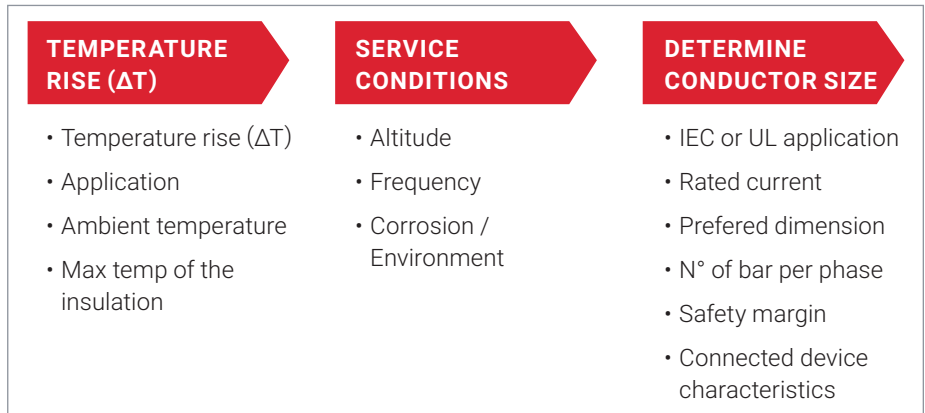
For Flexibar, we provided an ampacity table under different temperature rise, a lower temperature rise maybe used when the ambient temperature is higher than usual

For Flexibar, we recommend the maximum temperature rise does not exceed 50°C for a normal application.

Generally, 50°C is chosen as the default temperature rise considering the ambient temperature inside the panel is below 40°C. But when the connected part is an electrical component which may dissipate heat (for example circuit breaker) or the ventilation inside the enclosure is not efficient, it may necessary to choose lower temperature rise.

## HOW SIZING CONDUCTORS.

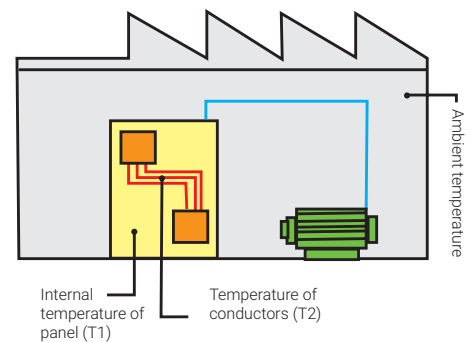
The chart below demonstrate the general steps to determine Flexibar size



## TEMPERATURE RISE OF THE CONDUCTOR.

Temperature rise of the conductor ( $\Delta T$ ) = Temperature of the conductor – Internal temperature of the panel.

Temperature rise of conductor =  $T2 - T1 = \Delta T$  (C°)



Ex: For a requested current of 630A, with:  $T1 = 40^\circ C - T2 = 90^\circ C$

$\Delta T = 90 - 40 = 50^\circ C$

In the  $\Delta T$  50°C column, find the closest current value to 630A.

Flexibar 5x32x1 – 160 mm<sup>2</sup> – 640A (IEC).

Select Flexibar according to the terminal width of the equipment being connected.

## FLEXIBAR IN PARALLEL

When using 2 or 3 Flexibar on edge in parallel for the same phase, use the current coefficient showed on the next IEC & UL ampacities tables:

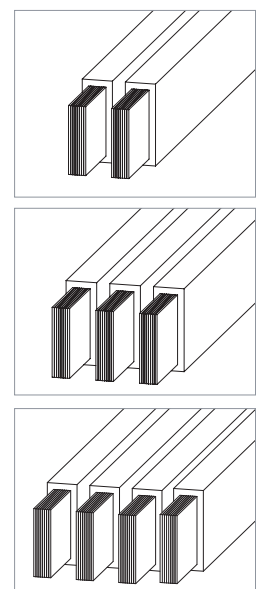
Ex: 5 x 32 x 1 –  $\Delta T = 50^\circ C$ : 640 A (IEC)

\*2 bars in parallel > 640 A x 1,72 = 1100 A

\*3 bars in parallel > 640 A x 2,25 = 1440 A

\*4 bars in parallel > 640 A x 2,93 = 1875 A

See next page for current coefficient by nVent ERIFLEX Flexibar Cross section




Typical Application Current Rating				Section (mm <sup>2</sup> )	ΔT 20° C (A)	ΔT 30° C (A)	ΔT 40° C (A)	ΔT 50° C (A)	ΔT 60° C (A)	ΔT 70° C (A)	Current Coefficient		
	N	A mm	B mm										
125 A	8	6	0.5	24	105	128	143	<b>166</b>	182	196	1.72	2.25	2.93
	3	9	0.8	21.6	85	104	120	<b>134</b>	147	158	1.72	2.25	2.93
	6	9	0.8	43.2	155	190	220	<b>245</b>	269	290	1.72	2.25	2.93
	3	13	0.5	19.5	106	130	150	<b>167</b>	184	198	1.72	2.25	2.93
	2	15.5	0.8	24.8	134	165	191	<b>212</b>	234	252	1.72	2.25	2.93
250 A	9	9	0.8	64.8	168	206	237	<b>265</b>	291	314	1.72	2.25	2.93
	6	13	0.5	39	160	196	226	<b>253</b>	277	300	1.72	2.25	2.93
	4	15.5	0.8	49.6	202	248	286	<b>320</b>	350	380	1.72	2.25	2.93
	2	20	1	40	174	214	246	<b>275</b>	300	326	1.72	2.25	2.93
	3	20	1	60	228	280	323	<b>360</b>	395	428	1.72	2.25	2.93
400 A	2	24	1	48	240	295	340	<b>380</b>	416	450	1.72	2.25	2.93
	6	15.5	0.8	74.4	254	318	360	<b>402</b>	440	476	1.72	2.25	2.93
	10	15.5	0.8	124	288	352	407	<b>455</b>	498	538	1.72	2.25	2.93
	4	20	1	80	254	312	360	<b>402</b>	440	476	1.72	2.25	2.93
	5	20	1	100	266	326	376	<b>420</b>	460	498	1.72	2.25	2.93
	6	20	1	120	292	358	413	<b>462</b>	506	546	1.72	2.25	2.93
	3	24	1	72	261	320	370	<b>413</b>	453	490	1.72	2.25	2.93
	4	24	1	96	294	360	416	<b>465</b>	510	550	1.72	2.25	2.93
	2	32	1	64	257	315	363	<b>406</b>	445	480	1.72	2.25	2.93
	3	32	1	96	304	372	430	<b>480</b>	525	570	1.72	2.25	2.93
500 A	2	40	1	80	288	352	406	<b>455</b>	500	538	1.72	2.25	2.93
	5	24	1	120	325	398	460	<b>514</b>	563	608	1.72	2.25	2.93
	6	24	1	144	358	438	506	<b>566</b>	620	670	1.72	2.25	2.93
	4	32	1	128	347	425	490	<b>548</b>	600	648	1.72	2.25	2.93
	3	40	1	120	330	405	466	<b>522</b>	570	617	1.72	2.25	2.93
630 A	4	40	1	160	389	476	550	<b>615</b>	673	727	1.72	2.25	2.93
	3	50	1	150	374	460	530	<b>592</b>	650	700	1.72	2.25	2.93
	10	20	1	200	408	500	576	<b>645</b>	706	762	1.72	2.25	2.93
	8	24	1	192	429	525	606	<b>678</b>	743	802	1.72	2.25	2.93
	5	32	1	160	405	496	573	<b>640</b>	702	758	1.72	2.25	2.93
800 A	6	32	1	192	452	555	640	<b>715</b>	783	846	1.72	2.25	2.93
	5	40	1	200	481	590	680	<b>760</b>	832	900	1.72	2.25	2.93
	4	50	1	200	460	563	650	<b>727</b>	795	860	1.72	2.25	2.93
	10	24	1	240	506	592	716	<b>800</b>	877	948	1.72	2.25	2.93
	8	32	1	256	544	667	770	<b>860</b>	943	1018	1.72	2.25	2.93
1000 A	6	40	1	240	544	667	770	<b>860</b>	943	1018	1.72	2.25	2.93
	5	50	1	250	588	718	830	<b>930</b>	1016	1100	1.72	2.25	2.93
	4	63	1	252	541	661	763	<b>855</b>	935	1010	1.65	2.12	2.70
	10	32	1	320	658	805	930	<b>1040</b>	1140	1230	1.72	2.25	2.93
	8	40	1	320	658	805	930	<b>1040</b>	1140	1230	1.72	2.25	2.93
	10	40	1	400	747	915	1055	<b>1181</b>	1295	1400	1.72	2.25	2.93
	6	50	1	300	655	802	925	<b>1035</b>	1135	1225	1.72	2.25	2.93
	8	50	1	400	743	912	1050	<b>1175</b>	1290	1393	1.72	2.25	2.93
	5	63	1	315	651	797	920	<b>1030</b>	1125	1220	1.65	2.12	2.70
	6	63	1	378	768	941	1085	<b>1215</b>	1330	1437	1.65	2.12	2.70
1250 A	4	80	1	320	642	785	906	<b>1015</b>	1110	1200	1.65	2.12	2.70
	5	80	1	400	743	910	1050	<b>1175</b>	1285	1390	1.65	2.12	2.70
	10	50	1	500	882	1080	1245	<b>1395</b>	1525	1650	1.72	2.25	2.93
	8	63	1	504	882	1080	1245	<b>1395</b>	1525	1650	1.65	2.12	2.70
	6	80	1	480	870	1065	1230	<b>1375</b>	1505	1627	1.65	2.12	2.70
1600 A	5	100	1	500	876	1070	1235	<b>1385</b>	1515	1635	1.6	2.02	2.40
	6	100	1	600	980	1205	1393	<b>1550</b>	1705	1843	1.6	2.02	2.40
	10	63	1	630	1012	1240	1435	<b>1600</b>	1755	1895	1.65	2.12	2.70
	8	80	1	640	1012	1240	1430	<b>1600</b>	1755	1895	1.65	2.12	2.70
	10	80	1	800	1123	1375	1585	<b>1775</b>	1945	2100	1.65	2.12	2.70
	8	100	1	800	1148	1405	1625	<b>1815</b>	1990	2147	1.6	2.02	2.40
	10	100	1	1000	1255	1535	1775	<b>1985</b>	2170	2350	1.6	2.02	2.40
12	100	1	1200	1338	1636	1890	<b>2115</b>	2315	2500	1.6	2.02	2.40	
10	120	1	1200	1474	1792	2070	<b>2330</b>	2550	2755	1.49	1.95	2.40	

- Admissible currents: This table indicates the temperature rise produced by chosen current in the given section. This calculation does not take into account the heat dissipation from the switch gear.
- It is therefore necessary to respect the instructions provided by the electrical device manufacturer.
- Temperature rise of the conductor (ΔT) = Temperature of the conductor – Internal temperature of the panel.

# UL Ampacities



Typical Application Current Rating				Section (mm <sup>2</sup> )	ΔT 20° C (A)	ΔT 30° C (A)	ΔT 35° C (A)	ΔT 40° C (A)	ΔT 45° C (A)	ΔT 50° C (A)	ΔT 60° C (A)	ΔT 65° C (A)	ΔT 70° C (A)	Current Coefficient		
	N	A mm	B mm		NEC® 310-16 60° C	NEC® 310-16 75° C	NEC® 310-16 90° C									
125 A	3	9	0.8	21.6	101	126	138	148	<b>158</b>	167	185	193	201	1.72	2.25	2.93
	3	13	0.5	19.5	102	128	139	150	<b>160</b>	169	187	195	203	1.72	2.25	2.93
	2	15.5	0.8	24.8	121	152	166	178	<b>190</b>	201	222	232	241	1.72	2.25	2.93
	6	13	0.5	39	150	188	205	221	<b>235</b>	249	275	287	299	1.72	2.25	2.93
	6	9	0.8	43.2	153	192	210	226	<b>241</b>	255	281	293	305	1.72	2.25	2.93
250 A	2	20	1	40	168	211	229	247	<b>263</b>	279	307	321	334	1.72	2.25	2.93
	4	15.5	0.8	49.6	178	223	243	262	<b>279</b>	295	326	340	354	1.72	2.25	2.93
	2	24	1	48	195	244	266	286	<b>305</b>	323	357	373	388	1.72	2.25	2.93
	3	20	1	60	210	263	286	308	<b>328</b>	347	383	400	416	1.72	2.25	2.93
	6	15.5	0.8	74.4	225	282	308	331	<b>353</b>	374	412	430	448	1.72	2.25	2.93
	3	24	1	72	243	304	331	356	<b>379</b>	402	443	463	482	1.72	2.25	2.93
	4	20	1	80	246	308	336	361	<b>385</b>	408	450	470	489	1.72	2.25	2.93
	2	32	1	64	248	311	338	364	<b>388</b>	411	454	474	493	1.72	2.25	2.93
400 A	5	20	1	100	280	351	382	411	<b>438</b>	464	512	535	556	1.72	2.25	2.93
	4	24	1	96	285	356	388	418	<b>445</b>	472	520	543	565	1.72	2.25	2.93
	2	40	1	80	301	376	409	440	<b>470</b>	497	549	573	596	1.72	2.25	2.93
	3	32	1	96	308	385	419	451	<b>481</b>	510	562	587	611	1.72	2.25	2.93
	6	20	1	120	311	390	424	457	<b>487</b>	516	569	594	618	1.72	2.25	2.93
	5	24	1	120	322	403	439	472	<b>504</b>	534	589	615	640	1.72	2.25	2.93
	6	24	1	144	357	448	487	524	<b>559</b>	592	653	682	710	1.72	2.25	2.93
	4	32	1	128	359	449	489	526	<b>561</b>	594	655	684	712	1.72	2.25	2.93
	3	40	1	120	371	464	505	544	<b>580</b>	614	677	707	736	1.72	2.25	2.93
	5	32	1	160	405	507	552	594	<b>633</b>	671	740	773	804	1.72	2.25	2.93
	8	24	1	192	424	531	578	622	<b>663</b>	702	775	809	841	1.72	2.25	2.93
	4	40	1	160	432	541	589	633	<b>675</b>	715	789	824	857	1.72	2.25	2.93
	6	32	1	192	448	561	611	657	<b>701</b>	742	819	855	889	1.72	2.25	2.93
	3	50	1	150	449	562	612	658	<b>702</b>	743	820	856	891	1.72	2.25	2.93
	10	24	1	240	484	606	660	710	<b>757</b>	802	885	924	961	1.72	2.25	2.93
5	40	1	200	486	608	662	712	<b>759</b>	804	887	926	964	1.72	2.25	2.93	
800 A	4	50	1	200	521	651	709	763	<b>813</b>	861	950	992	1032	1.72	2.25	2.93
	8	32	1	256	525	657	715	770	<b>821</b>	869	959	1001	1042	1.72	2.25	2.93
	6	40	1	240	535	669	728	784	<b>835</b>	885	976	1019	1061	1.72	2.25	2.93
	3	63	1	189	549	687	747	804	<b>857</b>	907	1002	1046	1088	1.65	2.12	2.70
	5	50	1	250	583	730	794	855	<b>911</b>	965	1065	1112	1157	1.72	2.25	2.93
	6	45	1	270	588	736	801	862	<b>919</b>	973	1074	1121	1167	1.72	2.25	2.93
	10	32	1	320	595	745	811	873	<b>931</b>	986	1088	1136	1182	1.72	2.25	2.93
	8	40	1	320	628	786	855	920	<b>981</b>	1039	1146	1197	1246	1.72	2.25	2.93
	4	63	1	252	633	792	861	927	<b>988</b>	1046	1155	1205	1255	1.65	2.12	2.70
	6	50	1	300	641	802	873	940	<b>1002</b>	1061	1171	1222	1272	1.72	2.25	2.93
	3	80	1	240	675	844	918	988	<b>1053</b>	1115	1231	1285	1337	1.65	2.12	2.70
	10	40	1	400	702	879	956	1029	<b>1097</b>	1162	1282	1338	1393	1.72	2.25	2.93
	5	63	1	315	706	883	961	1033	<b>1102</b>	1167	1288	1344	1399	1.65	2.12	2.70
	8	50	1	400	741	927	1009	1085	<b>1157</b>	1226	1352	1412	1469	1.72	2.25	2.93
	1200 A	6	63	1	378	772	966	1051	1130	<b>1205</b>	1276	1408	1470	1530	1.65	2.12
4		80	1	320	776	970	1056	1136	<b>1211</b>	1282	1415	1477	1538	1.65	2.12	2.70
10		50	1	500	831	1040	1132	1217	<b>1298</b>	1375	1517	1584	1648	1.72	2.25	2.93
5		80	1	400	861	1077	1172	1260	<b>1344</b>	1423	1570	1640	1706	1.65	2.12	2.70
8		63	1	504	886	1108	1205	1297	<b>1383</b>	1464	1616	1687	1756	1.65	2.12	2.70
6		80	1	480	938	1172	1275	1372	<b>1463</b>	1549	1709	1785	1858	1.65	2.12	2.70
10		63	1	630	985	1232	1341	1442	<b>1538</b>	1628	1797	1876	1953	1.65	2.12	2.70
1600 A	5	100	1	500	1041	1301	1416	1523	<b>1624</b>	1719	1898	1982	2062	1.6	2.02	2.40
	8	80	1	640	1073	1341	1460	1570	<b>1674</b>	1773	1956	2043	2126	1.65	2.12	2.70
	6	100	1	600	1132	1414	1539	1655	<b>1765</b>	1869	2062	2153	2241	1.6	2.02	2.40
	10	80	1	800	1187	1484	1614	1736	<b>1851</b>	1960	2164	2259	2351	1.65	2.12	2.70
	8	100	1	800	1279	1598	1739	1870	<b>1994</b>	2111	2330	2433	2532	1.6	2.02	2.40
2000 A	10	100	1	1000	1413	1765	1921	2066	<b>2203</b>	2332	2574	2688	2797	1.6	2.02	2.40
	12	100	1	1200	1537	1920	2089	2247	<b>2396</b>	2537	2800	2924	3043	1.6	2.02	2.40

- Admissible currents: This table indicates the temperature rise produced by chosen current in the given section. This calculation does not take into account the heat dissipation from the switch gear.
- It is therefore necessary to respect the instructions provided by the electrical device manufacturer.
- Temperature rise of the conductor (ΔT) = Temperature of the conductor – Internal temperature of the panel.

# nVent ERIFLEX Flexibar UL & CSA Certification

## QUALITY VALIDATED BY TESTS & CERTIFICATIONS

UL 67 & UL 891 tests (UL file QEUY2/8. E125470).

In UL file QEUY2/8. E125470, Flexibar Advanced and Flexibar Standard are UL Recognized per ANSI/UL 67 "Panelboards", ANSI/UL 891 "Switchboards", CSA C22.2 No. 29 (Panelboards), and CSA C22.2 No. 244 (Switchboards).

UL 758 tests (UL file AVLV2/8 .E316390).

In UL file AVLV2/8 .E316390, Flexibar Advanced and Flexibar Standard are UL Recognized per ANSI/UL 758 "Appliance Wiring Material", under style 11715 (1000VAC/1500VDC) and CSA C22.2 No. 210 (Appliance Wiring Material).

CSA also certified Flexibar Advanced per CSA C22.2 No. 210 (1000 VAC).



In order to be recognized, these products have to undergo a series of rigorous tests that will assess of their performance in a lab setting reproducing the working environment of a real panelboard or switchboard.



Temperature/current test



Dielectric voltage-withstand test



Detailed examination



Physical properties



Cold bend test



Heat shock test



Flexibility test



Deformation test



Vertical flame test



VW-1 flame test



Insulation resistance test



Temperature correction factor

# Skin Effect On Alternative Current Application

**Skin effect** is the tendency of an alternating electric current (AC) to become distributed within a conductor such that the current density is largest near the surface of the conductor, and decreases with greater depths in the conductor.

The skin effect is due to opposing eddy currents induced by the changing magnetic field resulting from the alternating current. At 60 Hz in copper, the skin depth is about 8.5 mm (for a round conductor).

The Flexibar and its rectangular geometry do not have these limitations and has a low skin effect ratio.

Skin effect is a phenomenon which has the effect of concentrating the current on the perimeter of the conductor.

Its importance depends of frequency, the resistance of the material and the shape of the conductor.

The ratio of width/thickness for Flexibar is greater than cables and allows having a "good skin effect".

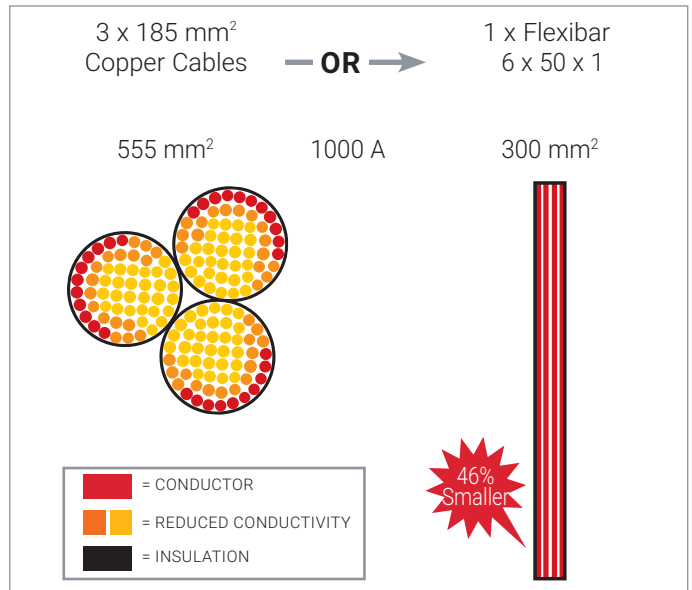
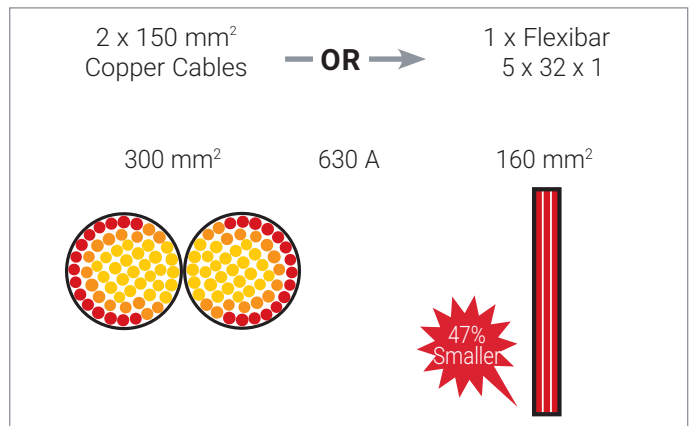
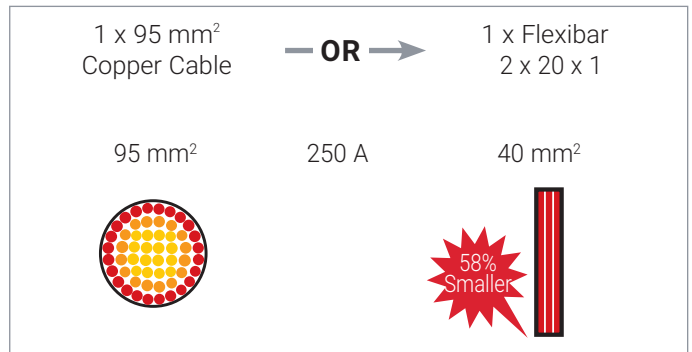
For the same cross section area, Flexibar has a greater surface area for cooling in addition to having a more uniform current density.

## EDDY CURRENTS

Flexibar has higher current-carrying capacities than cables or rigid bars with the same cross-section due to their lamellar structure (limitation of eddy currents), their shape (better heat dissipation) and their permissible temperature.

## SKIN EFFECT ON A.C. APPLICATION

Comparison to the penetration depth between:



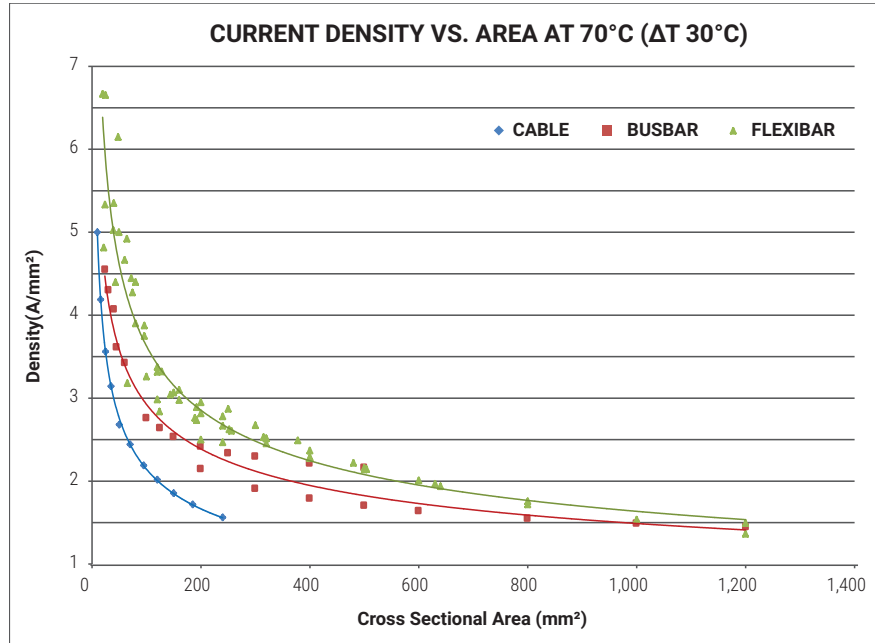
Representative to scale.

Flexibar intensity and cable intensity are based on conductor temperature rise of 50°C.

# Current Density

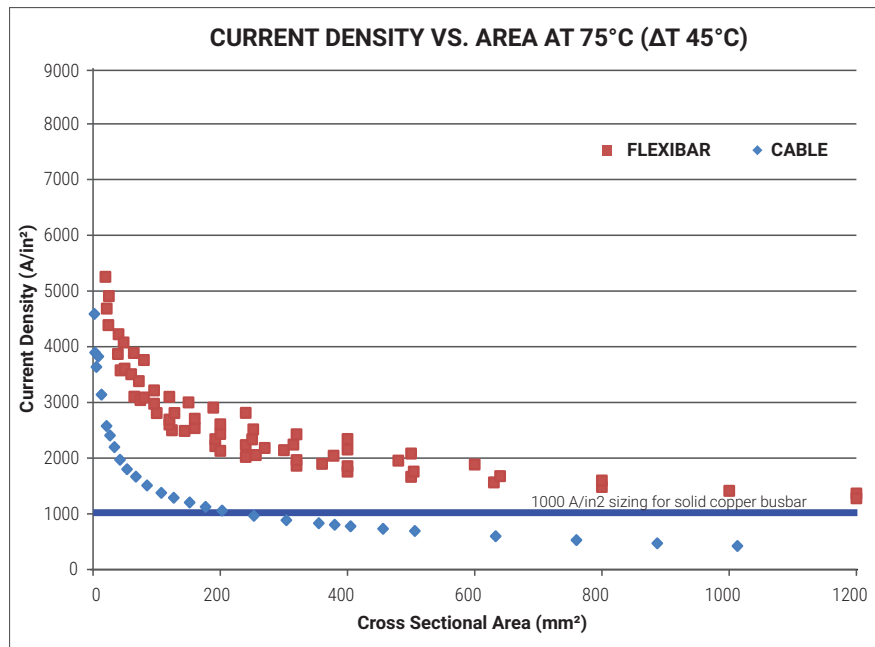
## CURRENT DENSITY AS PER IEC 61439-1

This graphic compares the Current density between round cable, bare copper bar and Flexibar at 50/60Hz Frequency, at 70°C working temperature (30°C temperature rise).



## CURRENT DENSITY AS PER UL

This graphic compares the Current density between round cable and Flexibar at 50/60Hz Frequency, at 75°C working temperature (45°C temperature rise).



# Skin Effect And Frequency

## **SKIN EFFECT IS INCREASING IN FUNCTION OF THE FREQUENCY.**

The current ratings of Flexibar as published in our catalog and web site are based on operating frequency up to 100HZ. As the fact that all copper conductors have higher impedance at higher frequencies, so a de-rating factor should be applied for a particular application operated at higher frequencies. However, the rectangular cross-section of Flexibar reduces this effect as compared to cables with round cross-section.

## **TIME, SPACE, MATERIAL SAVING:**

Those side pictures showing a typical application where Flexibar advantages have been used.

This panel has been modified. For each phase, 2 cables are replaced by Flexibar.

Designing early with Flexibar is necessary to take advantage of the full benefits of size, material, weight and cost savings. If designed on time, the enclosure size would have been much smaller.

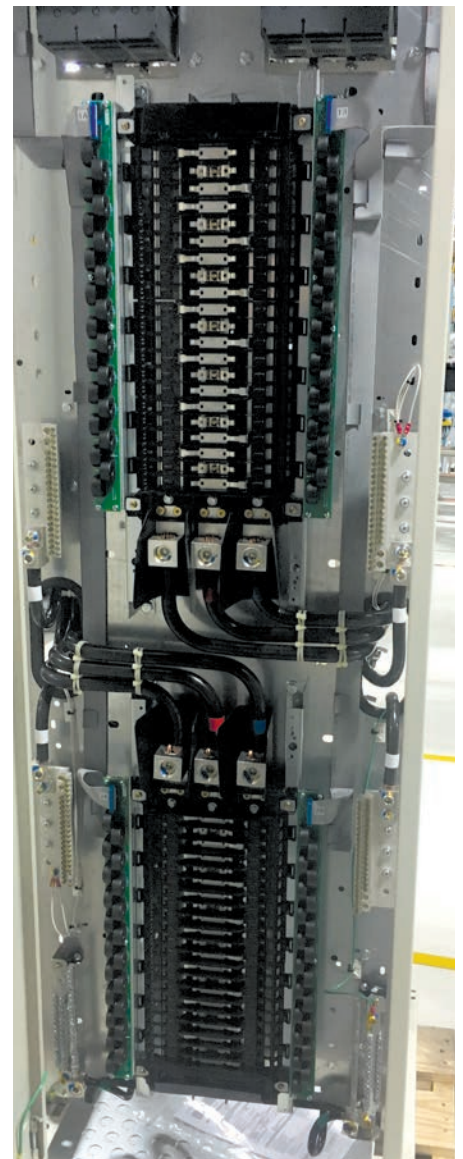
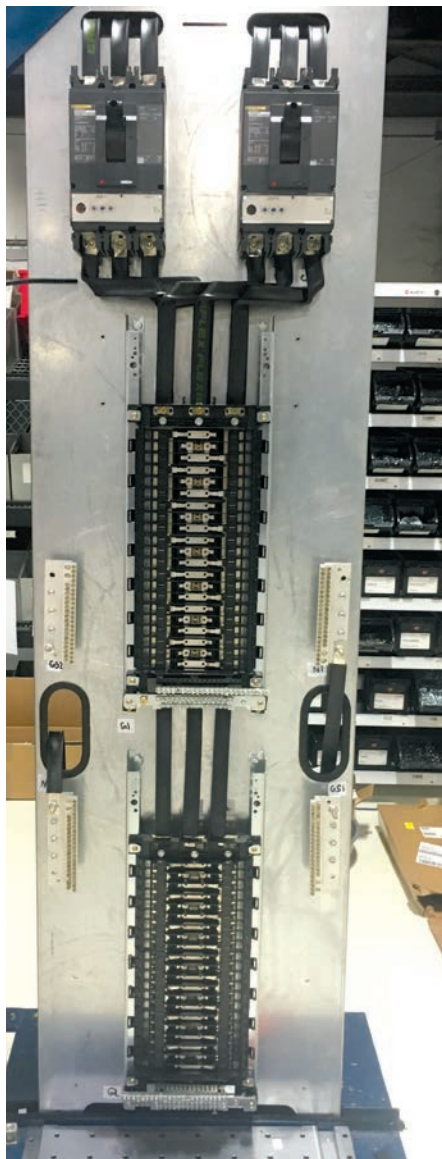
The cable bending radiuses significantly increases the enclosure size.

Due to "Skin effect", 2 cables can be replaced by 1 Flexibar only.

## **CURRENT PENETRATION DATA:**

- 1 Hz = 64mm
- 50 Hz = 9,28mm
- 250 Hz = 4,15mm
- 500 Hz = 2,93mm
- 1000 Hz = 2,07mm

For higher 100 Hz Frequency, an ampacity derating needs to be applied. Please refer to our technical document: Flexibar Performance with Frequency available from our website: [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX)



# Power Dissipation

**Joule heating**, also known as ohmic heating and resistive heating, is the process by which the passage of an electric current through a conductor produces heat.

This table is providing the Power dissipation generated by Flexibar at Typical Application current rating with ambient temperature of 35°C.


The values in the table are in Watt per meter and for one phase

If Flexibar is not used at typical application current rating but within higher or lower value, you can use our nVent ERIFLEX online software to determine the power losses at your specific current Rating



[nVent.com/ERIFLEX](https://eriflex-configurator.nvent.com/eriflex/)  
or contact your sales representative

<https://eriflex-configurator.nvent.com/eriflex/>


Typical Application Current Rating				Section (mm <sup>2</sup> )	Power dissipation at Typical Application current rating W/m/phase
	N	A (mm)	B (mm)		
125 A	8	6	0.5	24	15
	3	9	0.8	21.6	16
	6	9	0.8	43.2	8
	3	13	0.5	19.5	18
	2	15.5	0.8	24.8	14
250 A	9	9	0.8	64.8	22
	6	13	0.5	39	36
	4	15.5	0.8	49.6	29
	2	20	1	40	36
	3	20	1	60	24
	2	24	1	48	29
400 A	6	15.5	0.8	74.4	49
	10	15.5	0.8	124	30
	4	20	1	80	45
	5	20	1	100	37
	6	20	1	120	31
	3	24	1	72	51
	4	24	1	96	38
	2	32	1	64	57
	3	32	1	96	38
500 A	2	40	1	80	45
	5	24	1	120	48
	6	24	1	144	40
	4	32	1	128	45
	3	40	1	120	48
	4	40	1	160	36
630 A	3	50	1	150	38
	10	20	1	200	46
	8	24	1	192	48
	5	32	1	160	57
	6	32	1	192	48
	5	40	1	200	46
800 A	4	50	1	200	46
	10	24	1	240	62
	8	32	1	256	59
	6	40	1	240	62
	5	50	1	250	60
1000 A	4	63	1	252	59
	10	32	1	320	74
	8	40	1	320	74
	10	40	1	400	60
	6	50	1	300	79
	8	50	1	400	60
	5	63	1	315	75
	6	63	1	378	63
	4	80	1	320	74
1250 A	5	80	1	400	60
	10	50	1	500	76
	8	63	1	504	75
	6	80	1	480	79
	5	100	1	500	77
1600 A	6	100	1	600	64
	10	63	1	630	101
	8	80	1	640	99
	10	80	1	800	81
	8	100	1	800	81
	10	100	1	1000	67
	12	100	1	1200	58
10	120	1	1200	58	



# Thermal Short-Circuit Strength

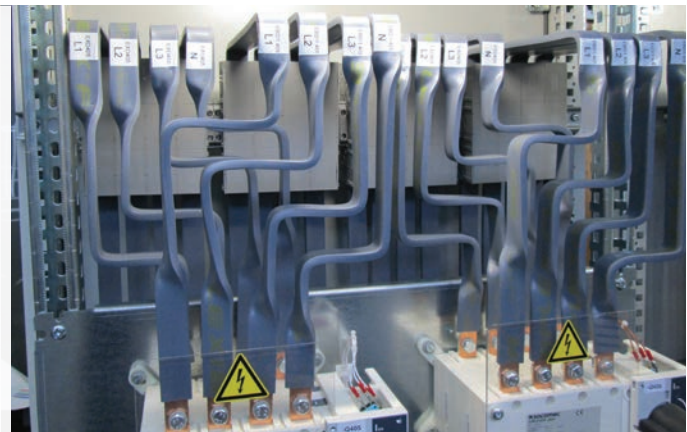
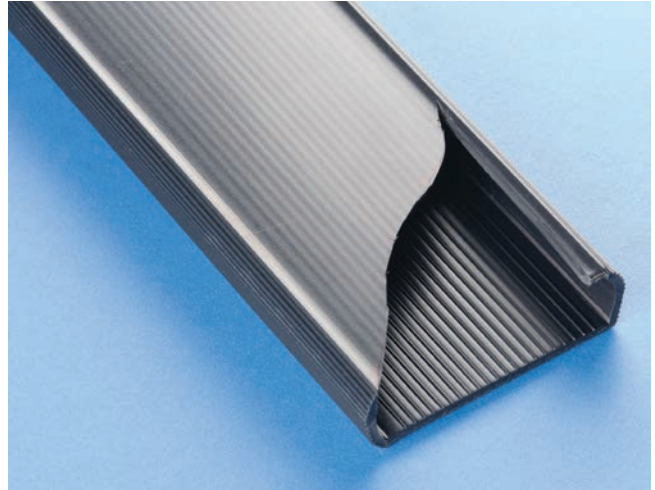
**A thermal phenomenon** is created by the ampacity carried in the conductive parts. The increase of conductor temperature is linked to the resistivity of the conductor material and cross section, ampacity and duration.

This phenomenon may destroy the device or the conductor insulation if the selection is not properly done. The device or conductor characteristics are quantified by a maximum admissible ampacity (I<sub>cw</sub>). nVent ERIFLEX Low voltage power connections software allows a user to calculate the needed minimum cross section for a requested I<sub>cw</sub> value and duration according to the IEC 61439.1, annex B.

				Thermal short-circuit strength (I <sub>cw</sub> ) acc. To IEC 61439.1			
				Flexibar Advanced and Flexibar Standard		Flexibar Summum	
N	A (mm)	B (mm)	Section (mm <sup>2</sup> )	kA (0,2 second)	kA (0,5 second)	kA (0,2 second)	kA (0,5 second)
8	6	0.5	24	8	5	9	6
3	9	0.8	21.6	7	4	9	5
6	9	0.8	43.2	14	9	17	11
3	13	0.5	19.5	6	4	8	5
2	15.5	0.8	24.8	8	5	10	6
9	9	0.8	64.8	21	13	26	16
6	13	0.5	39	12	8	15	10
4	15.5	0.8	49.6	16	10	20	12
2	20	1	40	13	8	16	10
3	20	1	60	19	12	24	15
2	24	1	48	15	10	19	12
6	15.5	0.8	74.4	24	15	29	19
10	15.5	0.8	124	40	25	49	31
4	20	1	80	26	16	31	20
5	20	1	100	32	20	39	25
6	20	1	120	38	24	47	30
3	24	1	72	23	15	28	18
4	24	1	96	31	19	38	24
2	32	1	64	20	13	25	16
3	32	1	96	31	19	38	24
2	40	1	80	26	16	31	20
5	24	1	120	38	24	47	30
6	24	1	144	46	29	57	36
4	32	1	128	41	26	50	32
3	40	1	120	38	24	47	30
4	40	1	160	51	32	63	40
3	50	1	150	48	30	59	37
10	20	1	200	64	40	79	50
8	24	1	192	61	39	76	48
5	32	1	160	51	32	63	40
6	32	1	192	61	39	76	48
5	40	1	200	64	40	79	50
4	50	1	200	64	40	79	50
10	24	1	240	77	49	94	60
8	32	1	256	82	52	101	64
6	40	1	240	77	49	94	60
5	50	1	250	80	51	98	62
4	63	1	252	81	51	99	63
10	32	1	320	102	65	126	80
8	40	1	320	102	65	126	80
10	40	1	400	128	81	157	100
6	50	1	300	96	61	118	75
8	50	1	400	128	81	157	100
5	63	1	315	101	64	124	78
6	63	1	378	121	76	149	94
4	80	1	320	102	65	126	80
5	80	1	400	128	81	157	100
10	50	1	500	160	101	197	124
8	63	1	504	161	102	198	125
6	80	1	480	153	97	189	119
5	100	1	500	160	101	197	124
6	100	1	600	192	121	236	149
10	63	1	630	201	127	248	157
8	80	1	640	205	129	252	159
10	80	1	800	256	162	315	199
8	100	1	800	256	162	315	199
10	100	1	1000	320	202	394	249
12	100	1	1200	384	243	472	299
10	120	1	1200	384	243	472	299

# Flexibility: Innovative Patent Insulation

Flexibar Advanced and Standard has added grooves on the inner surface of the insulation sleeve to improve sliding between the central conductor and the insulation material. The grooves help to reduce the contact surface between the central conductor and the insulation material. This result enhances the flexibility of the flexible busbar. Result: <20% of the inner surface is in contact with the central conductor. This nVent ERIFLEX patented idea makes Flexibar more flexible than ever and allows users to optimize the design of their electrical power connection. This patent is applicable for the cross section indication by "\*" on the part number in our product catalogue.



Application pictures: Flexibar directly connected on various devices or rigid bars, with compact connection and from 125 A up to 4500A.

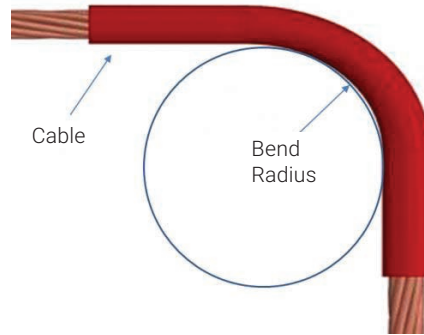
# Flexibility and Bending Radius Comparison with Cable

Bend radius is the minimum radius a pipe, cable, wire, sheet, cable, tube or hose can bend without damaging it. The minimum bend radius is the radius below which an object should not be bent.

The smaller the radius, the greater the flexibility of the material.

Due to the Flexibar construction, the flexibility allows for increased design flexibility. Flexibar is manufactured with copper layers and require less bending space than cable due to high flexibility and have no strict minimum bending radius constraint. It is possible to realize compact power connection and reduce the size and price of the enclosure and by consequence, the enclosure ground surface.

To determine how tight a given cable can be bent without damage, use the chart below to obtain the multiplier based on cable type. Note that this table is an overview. Cable manufacturer data should be checked.



Type	Min Bending Radius
Single or multiple conductor cables – no metallic shielding	8 x the overall cable diameter
Single conductor cable – with metallic shielding	12 x the overall cable diameter
Multiple conductor cables – with individually shielded conductors	12 x the individual cable diameter or 7 x the overall cable diameter (whichever is greater)

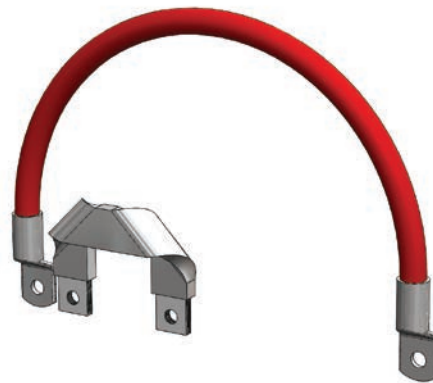
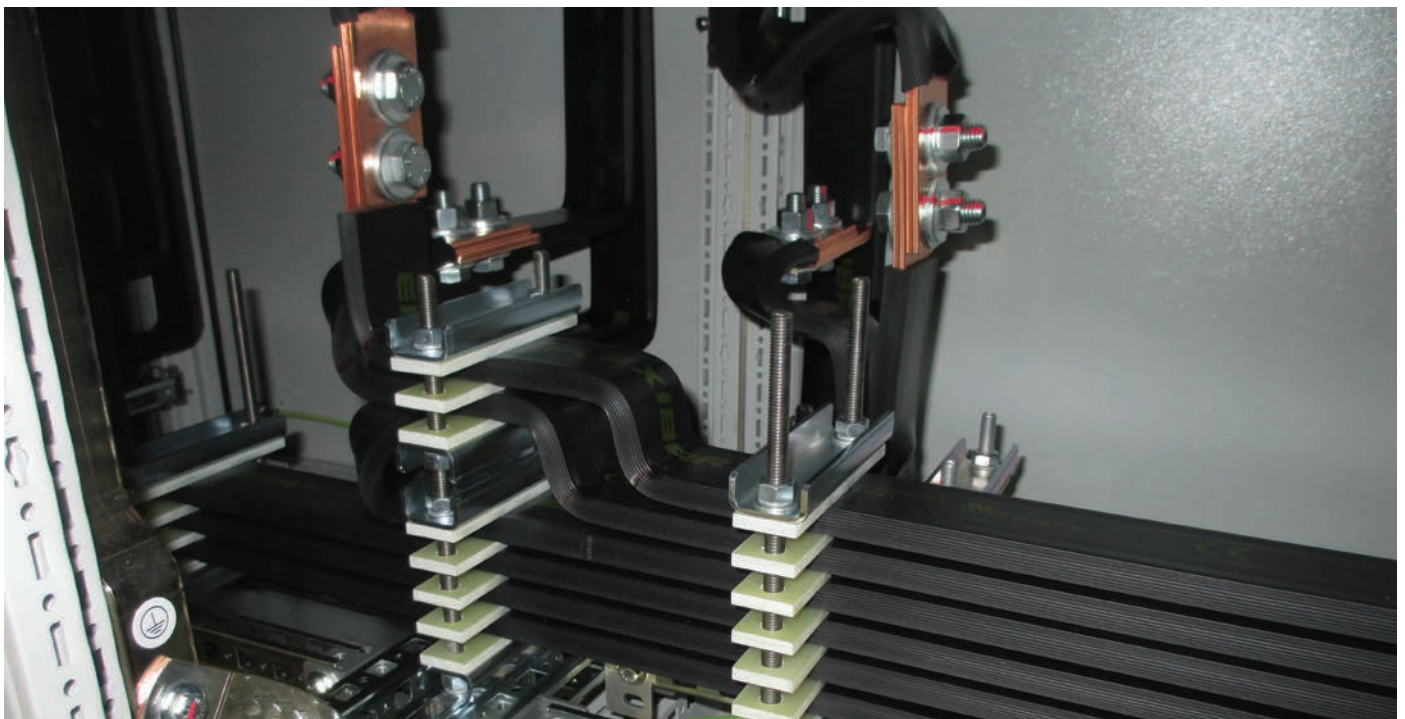


Table from NEC Articles 300-34, 334-11 & 336-16, as well as Appendix H of ICEA S-66-524 and ICEA S-68-516



# Class II Insulation

The Flexibar Advanced and Standard having Class II insulation certification, according IEC 61439-1 mainly due to:

- High dielectric strength (>20Kv/mm)
- High mechanical resistance (IK 09)
- High temperature resistance (Glow wire test 960°C)
- This certification allows:
  - Touching and fixing directly to metal parts permitted (no clearance distance needed).
  - Max operating current: up to 100% of the conductor maximum rated temperature (80% without Class II)



**TABLE 4 – CONDUCTOR SELECTION AND INSTALLATION REQUIREMENTS (8.6.4) FROM IEC 61 439-1**

Type of conductor	Requirements
Bare conductors or single-core conductors with basic insulation, for example cables according to IEC 60227-3.	Mutual contact or contact with conductive parts shall be avoided, for example by use of spacers.
Single-core conductors with basic insulation and a maximum permissible conductor operating temperature of at least 90°C, for example cables according to IEC 60245-3, or heat-resistant thermo-plastic (PVC) insulated cables according to IEC 60227-3.	Mutual contact or contact with conductive parts is permitted where there is no applied external pressure. Contact with sharp edges shall be avoided. These conductors may only be loaded such that an operating temperature of 80 % of the maximum permissible conductor operating temperature is not exceeded.
Conductors with basic insulation, for example cables according to IEC 60227-3, having additional secondary insulation, for example individually covered cables with shrink sleeving or individually run cables in plastic conduits.	No additional requirements
Conductors insulated with a very high mechanical additional requirements strength material, for example Ethylene Tetrafluoro Ethylene (ETFE) insulation, or double-insulated conductors with an enhanced outer sheath rated for use up to 3 kV, for example cables according to IEC 60502.	
Single or multi-core sheathed cables, for example cables according to IEC 60245-4 or IEC 60227-4.	

Insulation none Class II compliant are considered basic insulation. Additional requirements are mandatory.

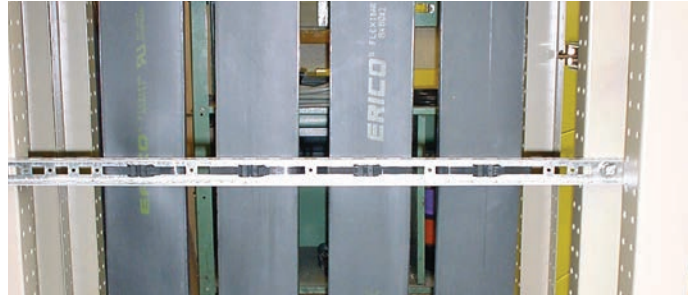


Flexibar Advanced and Standard are considered as a very high mechanical strength material insulation after test (class II). It gives the advantage of no additional requirements.



# Class II Insulation

The chapter 8.6 of internal electricals and connections of the IEC 61439-1 provides strict rules about conductor selection and installation to prevent short-circuit and its consequences. The table 4 defined the requirement of a bare conductor, basic insulated conductor and a reinforced/double insulated conductor (class II) that has to apply in a switchboard.



The advantage of using a reinforced/double insulated conductor is that the table 4 requires "no additional requirement":

## **BARE CONDUCTOR:**

- Clearance distance and supports / insulators.

Example: solid bars

## **BASIC INSULATION CONDUCTOR:**

- No contact or fixing directly to any metal parts
- operating temperature 80% of the maximum allow by the conductor to prevent the thermal short-circuit damages.

Example: conductors with shrinkable sleeve, one single core cables...

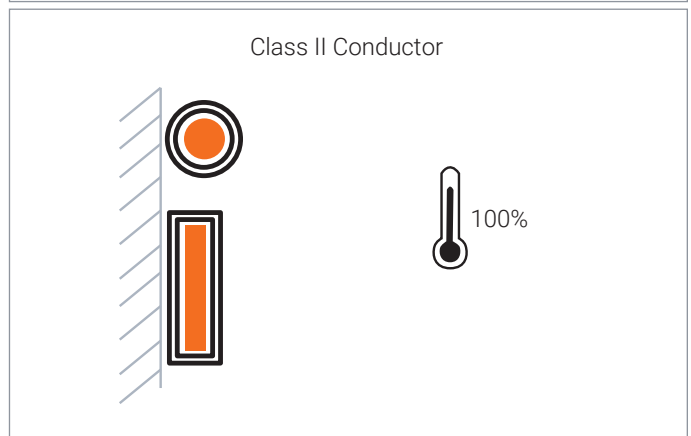
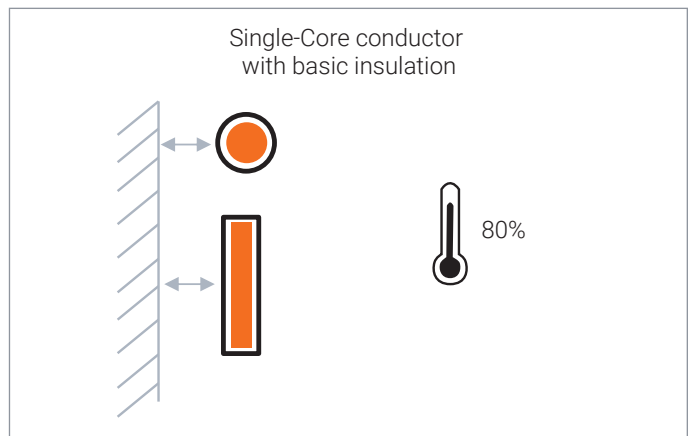
## **CLASS II CONDUCTOR:**

- Touching and fixing directly to metal parts permitted (no clearance distance needed)
- 100% Max operating temperature

105°C for Flexibar Standard

**115°C** for Flexibar Advanced

If any conductors do not fulfil the requirements, the circuit is subject to additional short-circuit test (10.11).

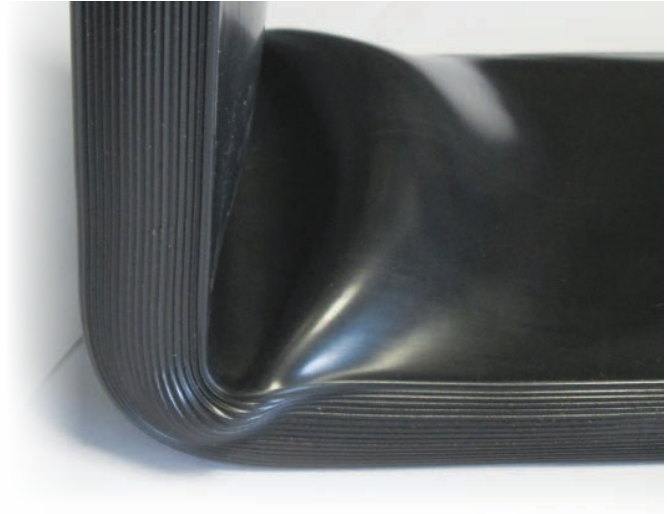


# Wrinkle On Insulation

Wrinkle appears during bending or folding for the larger cross sections. This phenomenon can be seen especially on Flexibar with 6 and more copper layer.

This deformation allows the insulation to take the position with the lowest level of stress.

Because of the plasticity of the insulation, this typical shape is normal and essential to release the stress of the insulation. This wrinkle does not change any Electrical or mechanical characteristic of the Flexibar.



# Altitude Effect

For conductors to be used at altitude exceeded 2000 m, it's necessary to take into the reduction of the dielectric strength and the cooling capacity affected by the air density. The air cooling capability drops along with the altitude increasing, a de-rating factor should be used as the altitude exceeds 2000m. The table below abstracted from DIN 43671 maybe used as a reference for rigid busbar and Flexibar.

Altitude (m)	Derating factor	
	Ampacities (A)	Voltage (V)
> 2000	0.99	0.99
> 3000	0.96	0.96
> 4000	0.9	0.8

# Halogen-Free (HF)

## HALOGEN-FREE (HF) MATERIAL DOES NOT CONTAIN:

- Fluorine
- Chlorine => (used for PVC)
- Bromine
- Iodine
- Astatine



## HALOGEN-FREE (HF) MATERIAL OFFERING:

- Better environmental impact
- Reduces in the quantity of toxic smoke for human
- Reduces corrosive smoke for electrical equipment's.

## HALOGEN-FREE (HF) FLEXIBAR IS TESTED AND COMPLIES WITH:

- IEC® 60754-1 (Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content)
- IEC® 62821-2 (Electric cables - halogen-free, low smoke, thermoplastic insulated and sheathed cables of rated voltages up to and including 450/750 V)
- UL® 2885 (Outline of Investigation for Acid Gas, Acidity and Conductivity of Combusted Materials)

Flexibar Advanced and Flexibar Summum are halogen-free conductors.

# Low Smoke (LS)

## LOW SMOKE (LS) MATERIAL OFFERING:

- Improves visibility conditions in case of fire due to lower density of smoke
- people can easily locate the emergency exit
- allows rescue workers to assess an emergency situation
- Less damaging electrical equipment's.

## LOW SMOKE (LS) FLEXIBAR IS TESTED AND COMPLIES WITH:

- IEC® 61034-2 (Measurement of smoke density of cables burning under defined conditions)
- IEC® 60695-6-2 (Fire hazard testing – Part 6-2: Smoke obscuration – Summary and relevance of test methods)
- ISO 5659-2 (determination of the optical density of smoke produced from a horizontally positioned test specimen subjected to a specific thermal radiation in a sealed chamber)
- UL® 2885 (Outline of Investigation for Acid Gas, Acidity and Conductivity of Combusted Materials)

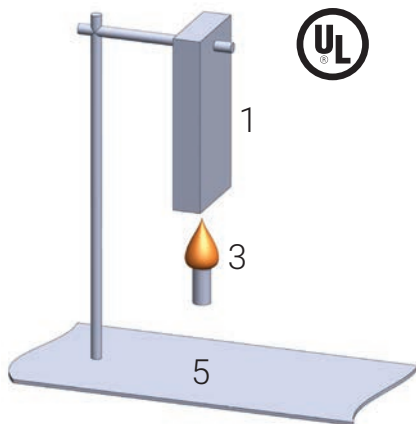
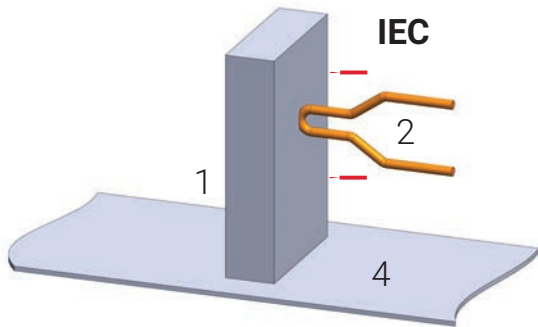
Flexibar Advanced is a low smoke conductor.

# Flame Retardant (FR)

Flame Retardant (FR) material, also called Self-Extinguishing material having the effect of slowing down the spread of fire and according to the international standards such as:

- UL 94V-0
- IEC 60695-2 (Glow Wire test)

## SAMPLE OF TEST SEQUENCE AND CLASSIFICATION



1. Specimen
2. Glow wire
3. Flame
4. Tissue
5. Cotton

## UL94 - TABLE 8.1

Material Classifications			
Criteria Conditions	94V-0	94V-1	94V-2
Afterflame time for each individual specimen t1 or t2	≤10s	≤30s	≤30s
Total afterflame time for any condition (t1 plus t2 for the 5 specimens)	≤50s	≤250s	≤250s
Afterflame plus afterglow time for each individual specimen after the second flame application (t2+t3)	≤30s	≤60s	≤60s
Afterflame or afterglow of any specimen up to the holding clamp	No	No	No
Cotton indicator ignited by flaming particles or drops	No	No	Yes

All Flexibar have a flammability rating of UL 94V-0.

In addition, Flexibar Standard and Advanced passed the IEC 60695-2 (Glow Wire test) at higher possible level (960°C) with burning or glow time ≤ 30s with the paper and wood undamaged during test sequence.

# EN 45545-2 Fire Testing to Railway Components

## EN 45545-2 EUROPEAN UNION STANDARD FIRE TESTING TO RAILWAY COMPONENTS

In order to choose the appropriate product for a given application, it is the customer's responsibility to understand the extent of use for the product, as well as the intended final use for the Rolling Stock. Vehicles are classified as: HL1, HL2 or HL3 depending on their time in tunnels and whether they contain sleeper cars. The HL1 classification represents the lowest Hazard Level and HL3 represents the highest. Please refer to EN 45545-2 for further definitions.

This standard provides guidance to quantify the impact of a fire compared with the product requirements classification.

nVent ERIFLEX Flexibar would fall under the R22 and R23 product requirement sets, depending on their installation location.

There are 3 tests used to establish product performance versus these product requirements:

- Oxygen index to TO1 EN ISO 4589-2
- Flue gas density to T 10.03 EN ISO 5659
- Oxygen index to T 12 NF X70-100-1 and -2

Performance requirements on EN 45545-2 for each of these tests are summarized below. Please refer to EN 45545-2 for additional details.

				HL1	HL2	HL3
R22	T01 EN ISO 4589-2 OI	Oxygen Content %	Minimum	28	28	32
	T10.03 EN ISO 5659-2: 25 kWm	Ds max. dimensionless	Maximum	600	300	150
	T12 NF X70-100-1: and -2, 600° C	CITnlp dimensionless	Maximum	1.2	0.9	0.75
R23	T01 EN ISO 4589-2: OI	Oxygen Content %	Minimum	28	28	32
	T10.03 EN ISO 5659-2: 25 kWm2	Ds max. dimensionless	Maximum	–	600	300
	T12 NF X70-100-1 and -2, 600° C	CITnlp dimensionless	Maximum	–	1.8	1.5

nVent ERIFLEX Flexibar Summum Conforms to EN 45545 obtaining an HL3 classification for chapters R22 and R23.  
nVent ERIFLEX Flexibar Advanced Conforms to EN 45545 obtaining an HL2 classification for chapters R22 and R23.





# Certifications for Marine & Offshore

## WORLDWIDE CERTIFICATION

nVent ERIFLEX is a trusted partner for assistance with designing your electrical cabinet. Our range of world-class certifications include:

- nVent ERIFLEX Flexibar Advanced: IEC 61 439-1 and UL 67 / UL 758
- Full nVent ERIFLEX product range is compliant with RoHS and CE

## NVENT ERIFLEX ADVANCED TECHNOLOGY CERTIFICATIONS

- Halogen-free: IEC 60754-1 and/or UL 2885 standards
- Low smoke: UL 2885 and IEC 60754-2
- Flame retardant: IEC 60695-2-11 Glow Wire test 960°C and/or UL 94-V0
- UV resistance: UL 2556 and UL 854



## NVENT ERIFLEX PRODUCT OFFERING.

### SPACE SAVINGS

In the marine and offshore market, space is critical for electrical cabinets and connections. Thanks to the innovative technology from nVent ERIFLEX you can reduce your footprint of your electrical cabinet.



### TIME SAVINGS

The design of an electrical panel is important. nVent ERIFLEX helps to simplify the connection with solutions that reduce labor time.

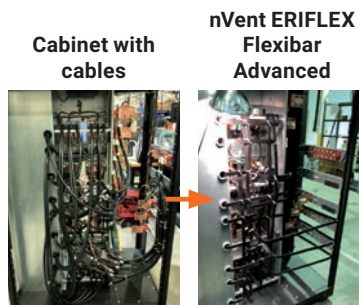
Our products are easy to shape and enable more efficient visual inspection.



### RELIABILITY

To enhance safety and reliability in enclosed spaces, nVent ERIFLEX has developed a complete and reliable range that uses tinned plate material for better corrosion resistance.

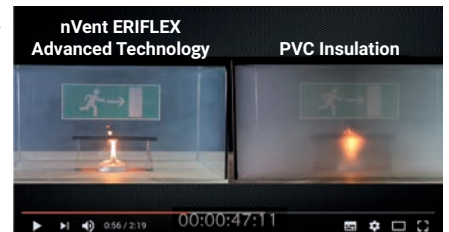
Additionally, our unique products help provide better access and improved vibration resistance.





### SAFER SOLUTIONS

Catering to the unique needs of the marine and offshore market, the latest generation of nVent ERIFLEX insulation material combines the following features:

- Low smoke, halogen-free, flame retardant
- High temperature resistant
- Tin-plated



Marine & Offshore Certifications		
nVent ERIFLEX Products		
Flexibar Advanced	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flexibar Standard	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

# How To Achieve A Good Electrical Connection

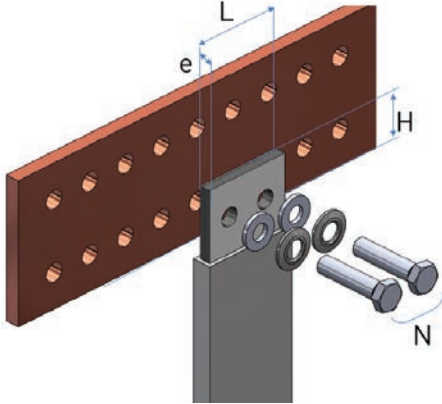
## CONTACT SURFACE CONDITIONS

The surface must be clean and flat but not polished. It must be oxide and grease free.

## CONTACT SURFACE (S) - OVERLAP

The overlap (H) should be not be less than 5 times the thickness (e) of the thinnest of the conductors.

$$S = H \times L$$

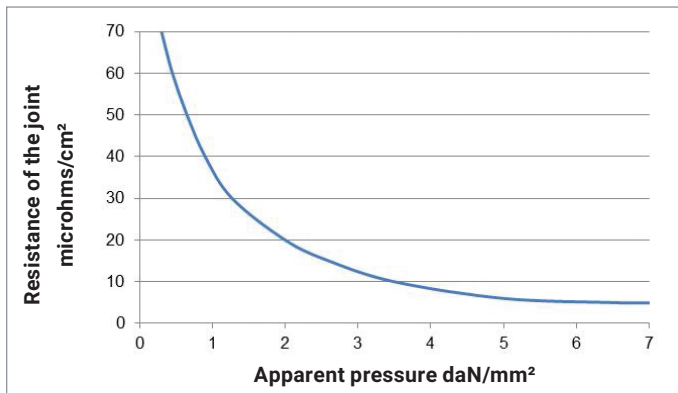


## NECESSARY CLAMPING FORCE (F)

This is a direct function of the contact area (S) and of an optimized value.

$$k = 2.5 \text{ daN/mm}^2$$

$$F = k \times S$$



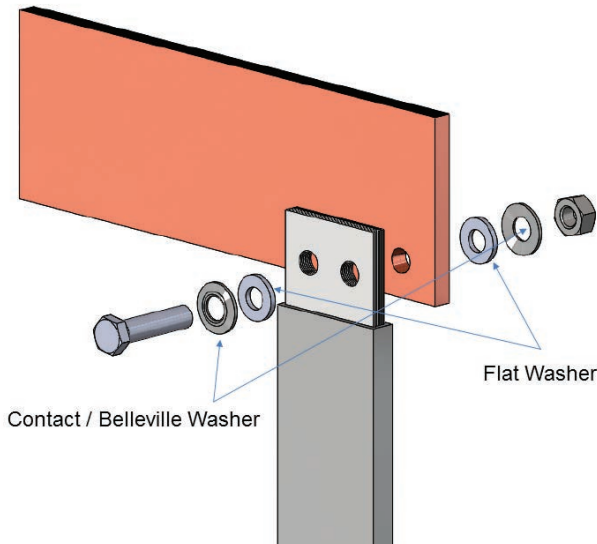
N	A (mm)	B (mm)	Metric			Imperial		
			Overlap H (mm)	Number of bolt N	Bolt size Ø	Overlap H (in)	Number of bolt N	Bolt size Ø
2	20	1	25	1	M6	1	1	1/4-20
3	20	1	25	1	M6	1	1	1/4-20
4	20	1	25	1	M8	1	1	5/16-18
5	20	1	25	1	M8	1	1	5/16-18
6	20	1	30	1	M10	1.2	1	7/16-14
10	20	1	50	2	M8	2	2	5/16-18
2	24	1	25	1	M8	1	1	5/16-18
3	24	1	25	1	M8	1	1	5/16-18
4	24	1	25	1	M8	1	1	5/16-18
5	24	1	25	1	M10	1	1	7/16-14
6	24	1	30	1	M10	1.2	1	7/16-14
8	24	1	40	1	M12	1.6	1	1/2-13
10	24	1	50	2	M10	2	2	7/16-14
2	32	1	25	1	M10	1	1	7/16-14
3	32	1	25	1	M10	1	1	7/16-14
4	32	1	25	1	M10	1	1	7/16-14
5	32	1	25	1	M10	1	1	7/16-14
6	32	1	30	1	M12	1.2	1	1/2-13
8	32	1	40	1	M12	1.6	1	1/2-13
10	32	1	50	2	M10	2	2	7/16-14
2	40	1	20	2	M8	0.8	2	5/16-18
3	40	1	25	1	M12	1	1	1/2-13
4	40	1	25	1	M12	1	1	1/2-13
5	40	1	30	1	M12	1.2	1	1/2-13
6	40	1	30	1	M12	1.2	1	1/2-13
8	40	1	40	2	M10	1.6	2	7/16-14
10	40	1	50	2	M12	2	2	1/2-13
3	50	1	25	2	M8	1	2	5/16-18
4	50	1	25	2	M8	1	2	5/16-18
5	50	1	25	2	M10	1	2	7/16-14
6	50	1	30	2	M10	1.2	2	7/16-14
8	50	1	40	2	M12	1.6	2	1/2-13
10	50	1	50	2	M12	2	2	1/2-13
3	63	1	25	2	M10	1	2	7/16-14
4	63	1	25	2	M10	1	2	7/16-14
5	63	1	25	2	M10	1	2	7/16-14
6	63	1	30	2	M12	1.2	2	1/2-13
8	63	1	40	2	M12	1.6	2	1/2-13
10	63	1	50	3	M12	2	3	1/2-13
4	80	1	25	3	M8	1	3	5/16-18
5	80	1	25	3	M10	1	3	7/16-14
6	80	1	30	3	M10	1.2	3	7/16-14
8	80	1	40	3	M12	1.6	3	1/2-13
10	80	1	50	3	M12	2	3	1/2-13
4	100	1	25	4	M8	1	4	5/16-18
5	100	1	25	4	M10	1	4	7/16-14
6	100	1	30	4	M10	1.2	4	7/16-14
8	100	1	40	4	M12	1.6	4	1/2-13
10	100	1	50	4	M12	2	4	1/2-13
12	100	1	60	5	M12	2.4	5	1/2-13
10	120	1	50	4	M12	2	4	1/2-13

# How To Achieve A Good Electrical Connection

## CLAMPING TORQUE CALCULATION

Use a class 8.8 ZN8C zinc plated bolt or a class coated bichromated bolt (SAE Grade 5), using "Contact/Belleville" and "Flat" washers tightened with a torque wrench, without lubrication.

Note: Belleville washers also called "Contact Disc Springs".



- Class 8.8 ZN8C or SAE Grade 5 hardware can be used except where otherwise designated by the designer of the pieces installed
- Contact/Belleville and flat washers to provide resistance to vibration
- Slotted holes are acceptable in applications where additional forming is anticipated during installation
- See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) to consult our metric and imperial nuts, bolt and washers contact kits.



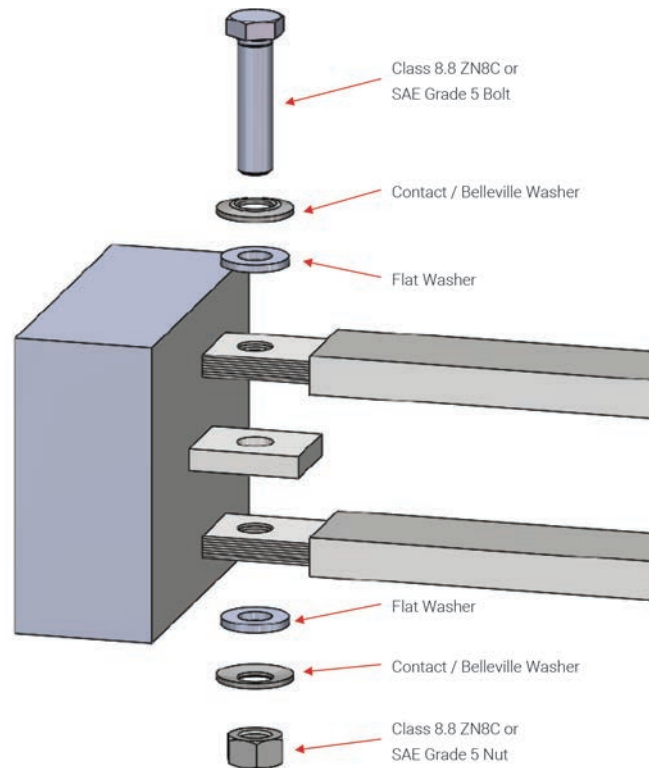
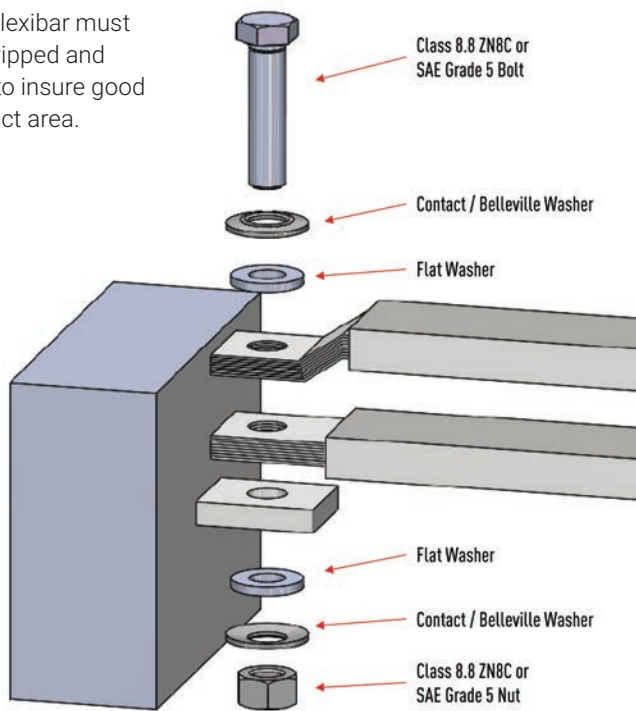
Metric (with contact washer)							
Bolt size Ø	M6	M8		M10	M12	M14	M16
F (daN)	800	1450		2300	3700	4400	6000
Clamping Torque (Nm)	13	30		60	110	174	274
Imperial (with Belleville washer)							
Bolt size Ø	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13	9/16-12	5/8-11
Clamping Torque (foot-pounds)	9	18	31	50	75	110	150



# How To Achieve A Good Electrical Connection

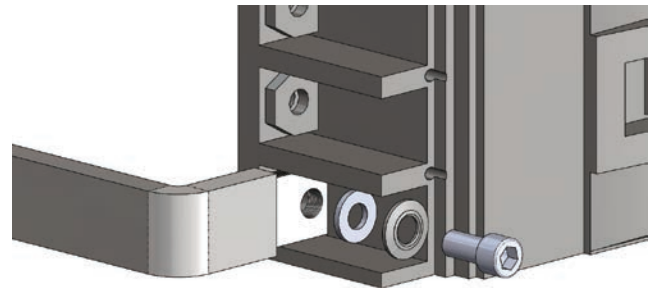
## TWO WAYS TO CONNECT FLEXIBAR IN PARALLEL:

Top Flexibar must be stripped and bent to insure good contact area.



## FLEXIBAR CONNECTED TO AN ELECTRICAL DEVICE:

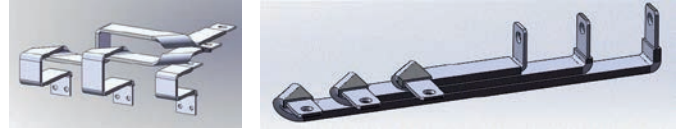
- Uses the basic hardware delivered with the device and add a flat washer if not provided.
- Apply the tightening torque specified in the device manual.



# Recommended Fabrication Procedures

## GENERAL DESIGN GUIDE - FABRICATED PARTS

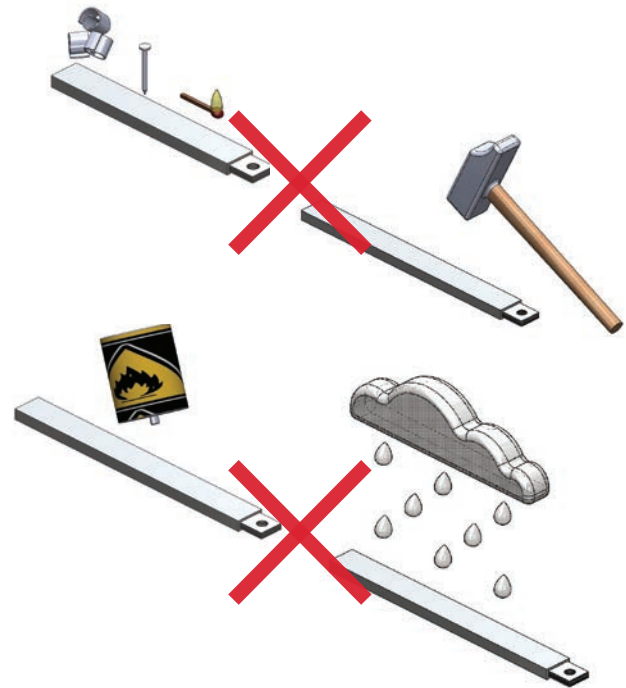
Custom part fabrication with Flexibar is relatively easy and can be accomplished with standard tools. When fabricating small quantities, ordinary hand tools are adequate. When fabricating large quantities, dedicated production tooling is more cost effective. The finished part will conform to your specified dimensions when installed, but may vary slightly when loose. This is due to Flexibar's inherent flexibility; its shape may be altered slightly during handling and shipment. This will quickly be remedied as the parts are placed into their application.



## SAFETY

Observe common safety precautions when working with Flexibar. For example, wear safety glasses and gloves when machining and/or working material.

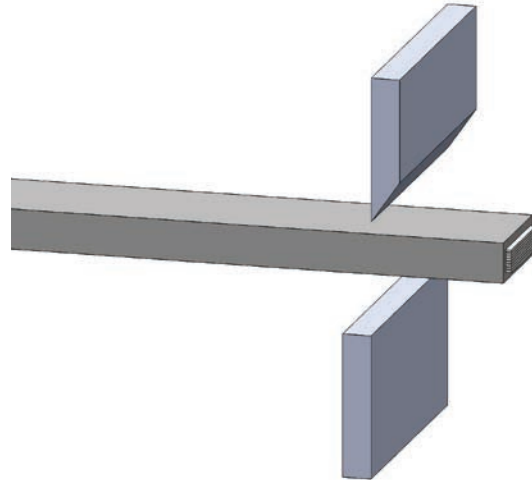
- Do not damage the insulation, for example with metal chips, heat, sharp tools.
- Plastic mallet can be used to flatten folding shape. Do not use metallic hammer.
- No contact to solvents or acids.
- Do not expose to dirt, water and humidity. This causes copper oxidation and endangers operating safety.



# Recommended Fabrication Procedures

## CUTTING

Handled properly, Flexibar can be cut by sawing or shearing. Nonetheless, we do not recommend using saw as it can create chips which can damage the Flexibar insulation, create big deformation and burrs on the copper laminates and increase considerably the risk of accidents. Final result should leave a clean cut, without flash. If Flexibar has to be bent or folded, it is recommended to add to the required length an extra 10mm per bend/fold to compensate the slippage of the copper layers.



## BENDING

All Flexibar cross section can be bent. Small cross section can be bent by hand. In any case, the insulation needs to be protected from damage. By using the nVent ERIFLEX tools, Flexibar can be not damaged during forming. Please use the recommended bending tools.

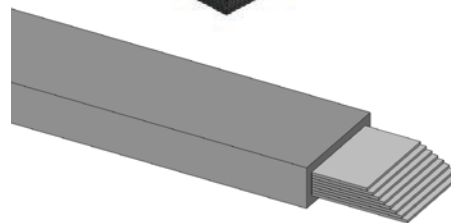
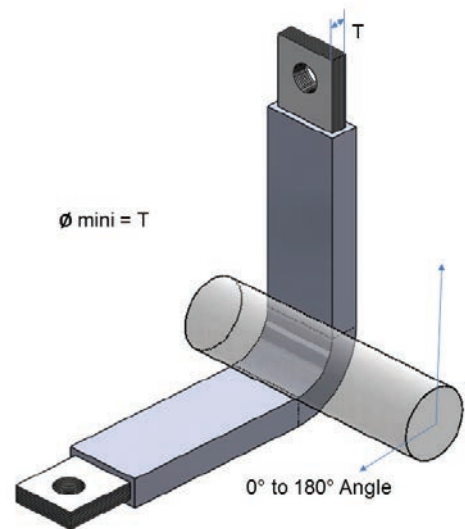
The bending radius is mainly given by the tool.

If other tools are used, specific attentions need to be done to do not form Flexibar over sharp edges.

Flexibar does not have really strict minimum bending radius. By default, the minimum bending radius is the thickness of the total copper layers.

Longitudinal sliding of the copper laminate is normal and it a part of the reason why Flexibar is very flexible.

With thicker material (more laminates), this effect is more pronounced.



# Recommended Fabrication Procedures

## TWISTING

All Flexibar cross section can be twisted.

For twisting, use the same recommendation as for bending.

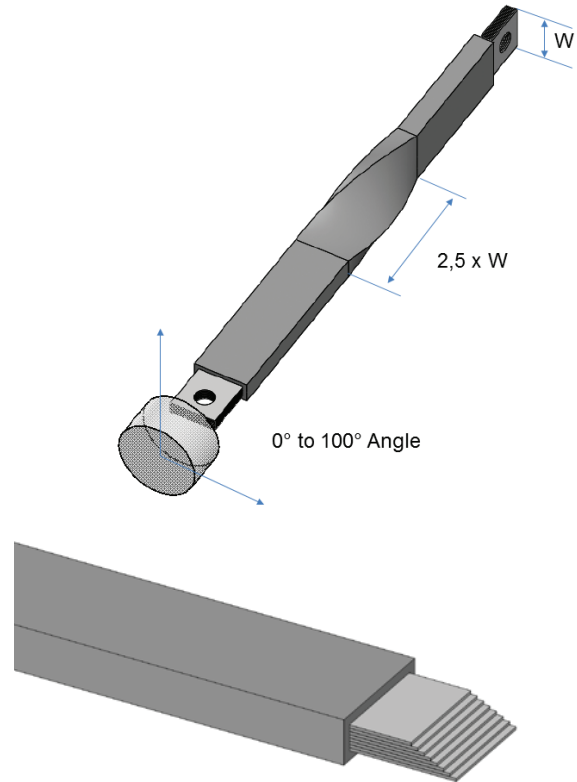
Flexibar can be twisted along its length. The best results (optimization of the strength applied and the compactness) are obtained when the twists are 90 degrees or less and with a typical length of twisting between 3 to 4 times the total busbar width. This distance must not be less than 2.5 with the traditional tools. Ensure when rotating by 90° that the necessary length is equivalent to 2.5 times minimum the busbar width. It is recommended that the part is not twisted greater than 100° degrees.

Lateral and longitudinal sliding of the copper laminate is normal and it a part of the reason why Flexibar is very flexible.

With thicker material (more laminates), this effect is more pronounced.

By using the nVent ERIFLEX tools, Flexibar can be not damaged during forming. Please use, the recommended nVent ERIFLEX twisting tool.

Flexibar Summum **cannot be twisted** with the nVent ERIFLEX twisting tool. Contact directly the nVent ERIFLEX representative to sub-contract this twisting into our internal workshop.



## FOLDING

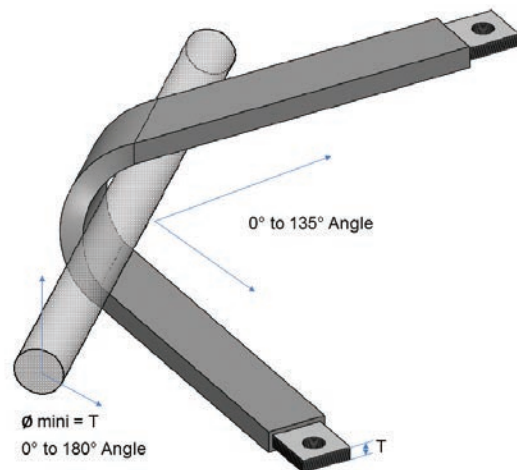
All Flexibar cross section can be folded. This operation can be done by hand for small cross section. For medium and big cross section, use the Folding tool from nVent ERIFLEX.

By using the nVent ERIFLEX tools, Flexibar can be not damaged during forming. Please use the recommended nVent ERIFLEX folding tools.

The bending radius is mainly given by the tool.

If other tools are used, specific attentions need to be done to do not form Flexibar over sharp edges.

Folding flatten with a soft hammer

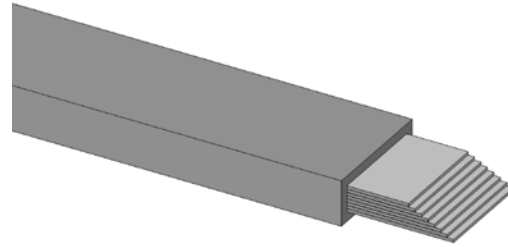


# Recommended Fabrication Procedures

Flexibar does not have really strict minimum bending radius. By default, the minimum bending radius is the thickness of the total copper layers.

Lateral and longitudinal sliding of the copper laminate is normal and it a part of the reason why Flexibar is very flexible.

With thicker material (more laminates), this effect is more pronounced.



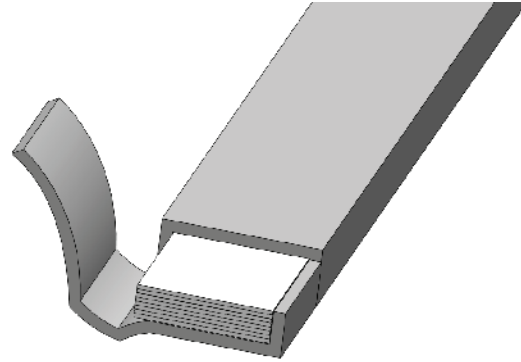
## STRIPPING

---

Stripping should be carried out using a stripper or a sharp tool as close as possible to the connection point, to restrict the amount of live, exposed parts. Do not damage copper layers during this stripping operation. A small mark can appear on the copper but do not alter the mechanical and electrical characteristics

By using the nVent ERIFLEX tools, Flexibar can be not damaged during stripping. nVent ERIFLEX tool optimize the stripping time (4 sides cut in on shot) , and reduce considerably the risk of injury (no knife or cutter) and insure to do not cut the insulation over the normal stripping area, creating reduction of clearance and creepage distance with other phases or earth.

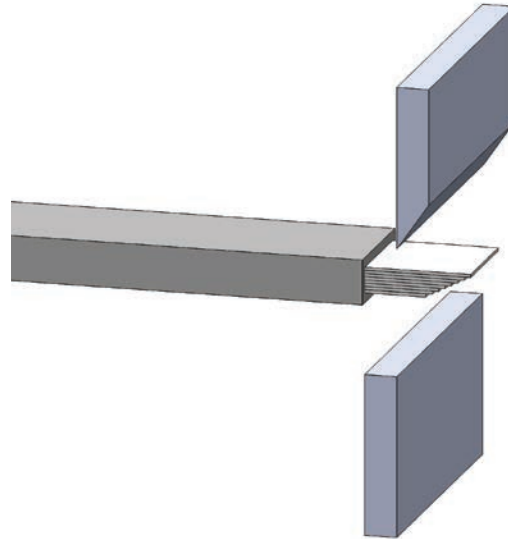
Please use the recommended nVent ERIFLEX stripping tools.



## CUT FINISHES

---

When Flexibar has been bended, folded or twisted, the individuals copper layers can slip. Before Flexibar is completed and a connection created, such inaccuracies must be mended by cutting.





# Recommended Fabrication Procedures

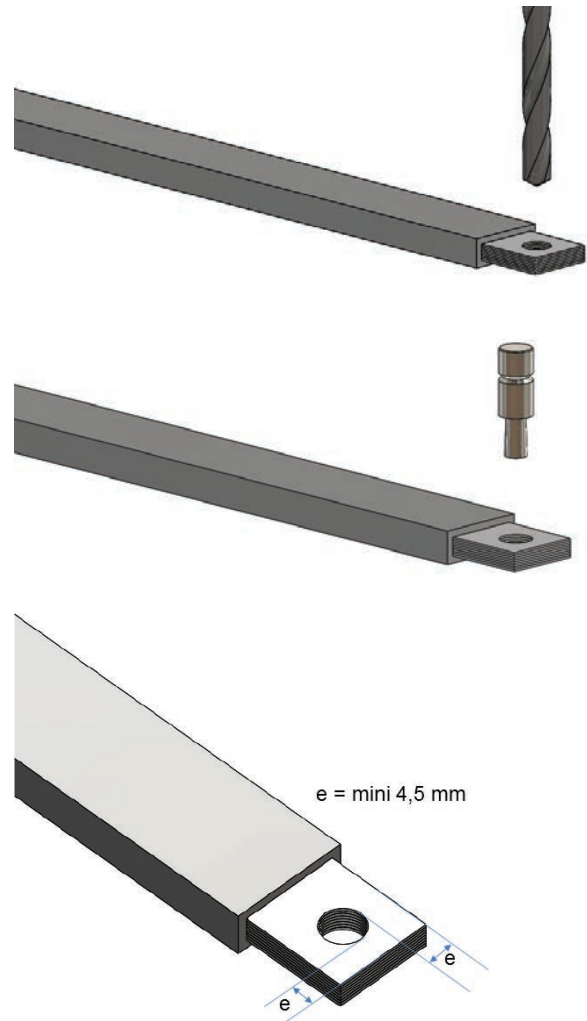
## DRILLING / PUNCHING

These operations are recommended to be done after Flexibar been shaped, and only after stripping the insulation. The best connection is achieved by punching. A punch fitted with a spring-loaded stripper plate that makes a clean cut and prevents layer deformation as the punch is withdrawn. As a rule, there should be around 0.2 mm clearance between the punch and the die. Ensure that the punch is kept sharp to avoid flash and prevent cuttings from getting between the copper layers. In case of drilling, use the adapted drilling tool that will lead the drill tip correctly and hold the copper layers. Made sur there is no burr and chip between insulation and copper layer.

By default, the edge-of-hole to edge-of-part minimum distance (e) is 4.5 mm.

Please use the nVent ERIFLEX drilling tools and punching tools.

Drilling diameter depends on the diameter of the bolts and nuts used.



Bolt Diameter (Metric)	Max. Drilling diameter (mm)
M6	7
M8	10
M10	12
M12	14
M14	16
M16	18

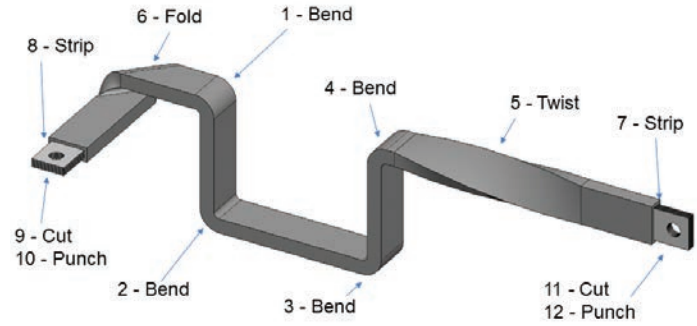
Bolt Diameter (Imperial)	Max. Drilling diameter (Inches)
1/4" - 20	5/16"
5/16" - 18	3/8"
3/8" - 16	7/16"
7/16" - 14	1/2"
1/2" - 13	9/16"
9/16" - 12	5/8"
5/8" - 11	11/16"

# Recommended Fabrication Procedures

## FABRICATION STEPS ORDER

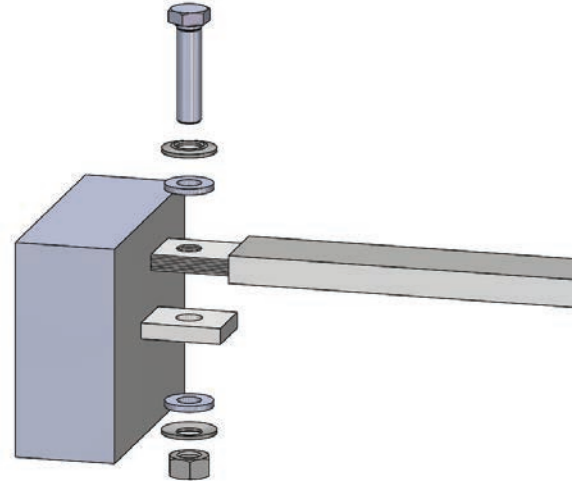
It is important to avoid stopping the sliding effect of the laminate when Flexibar is bended or folded.

The advice is to avoid bending between 2 bends. The laminate inside can produce a deformation of the insulation with the same aspect than a normal deformation. The only difference is that the deformed laminates can damage the inside part of the insulation. The below illustration is an example of steps order. Other steps order may be possible.

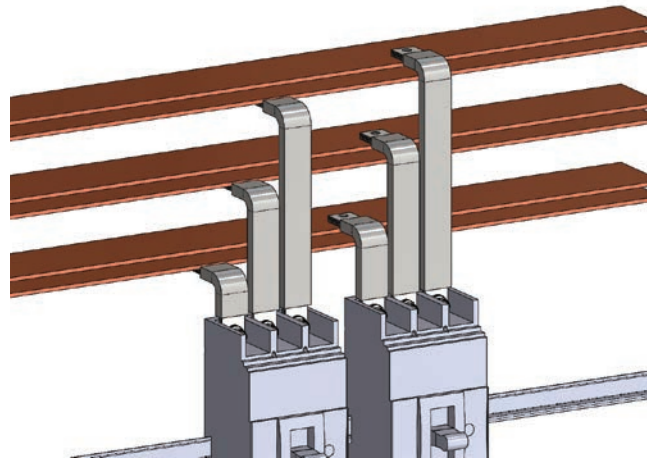


## CONNECTING

For connection on rigid busbar, use the recommended overlap/contact surface, torque and hardware quality from this guide. For connection on an electrical devices, use torque and hardware from the device manufacturer.



If the busbars have several bars per phase, the connection points must be distributed over the various bars of the same phase. This can be realized by using copper plate between copper bars or if possible, the Flexibar between 2 copper bars. This installation will guarantee a good repartition of current in the busbar.



# Recommended Fabrication Procedures

## FLEXIBAR CONNECTION ON MCCB

The below table provides some guidance regarding possible Flexibar cross section to use for some MCCB (Molded Case Circuit Breaker).

MCCB from this list are:

- IEC version
- Front access connection, without accessory
- Fixed version

This recommendation table taking in account:

- Width of the MCCB palm
- Rated Current of the MCCB.

This table do not taking in account some specific installation environment, like ambient temperature, protection level of enclosure, altitude, frequency...

Some MCCB may need more important cross section in function of the MCCB Power dissipation. In some case, increase the Flexibar cross section may be necessary to support MCCB heating dissipation. It is therefore necessary to respect the instructions provided by the electrical device manufacturer.

Rated Current of the circuit breaker	1600A	1250A	1000A	800A	630A	500A	400A	350A	300A	250A	125/160A	
Schneider Electric	NS 1600	NS 1250	NS 1000	NS 800	NSX 630	NSX 630	NSX 400	NSX 400	NSX 400	NSX 250	NSA NG 125	NSX 100 NSX 160
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	8 x 50 x 1	5 x 50 x 1	6 x 32 x 1	4 x 32 x 1	3 x 32 x 1	2 x 32 x 1	2 x 32 x 1	2 x 24 x 1	6 x 9 x 0,8	2 x 20 x 1
ABB	T max T7	T max T7	T max T6	T max T6	T max T5	T max T5	T max T5	Tmax T4	Tmax T4	Tmax T3/ XT3/XT4	Tmax T1/ T2/XT2	Tmax XT1
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	10 x 40 x 1	6 x 40 x 1	6 x 32 x 1	4 x 32 x 1	3 x 32 x 1	2 x 24 x 1	2 x 24 x 1	2 x 24 x 1	2 x 20 x 1	2 x 15,5 x 0,8
General Electric	FK 1600	FK 1250	FK 1250	FK 800	FG 630	FG 630	FG 400	FG 400	FG 400	FE 250	FE 160	FD 160
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	8 x 50 x 1	5 x 50 x 1	6 x 32 x 1	4 x 32 x 1	3 x 32 x 1	2 x 32 x 1	2 x 32 x 1	2 x 24 x 1	2 x 20 x 1	6 x 9 x 0,8
Siemens	VL1600 3VL8	VL1250 3VL7	VL1250 3VL7	VL800 3VL6	VL630 3VL5	VL630 3VL5	VL400 3VL4	VL400 3VL4	VL400 3VL4	VL250 3VL3	VL160 3VL2	VL160X 3VL1
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	8 x 50 x 1	6 x 40 x 1	5 x 40 x 1	3 x 40 x 1	3 x 32 x 1	2 x 32 x 1	2 x 32 x 1	2 x 24 x 1	2 x 20 x 1	2 x 15,5 x 0,8
Eaton / Moeller	NZM4	NZM4	NZM4	NZM4	NZM3	NZM3	NZM3	NZM3	NZM3	NZM3	NZM2	NZM1
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	8 x 50 x 1	5 x 50 x 1	6 x 32 x 1	4 x 32 x 1	3 x 32 x 1	2 x 32 x 1	2 x 32 x 1	2 x 24 x 1	6 x 9 x 0,8	
Legrand / Bticino	DPX 1600	DPX 1600	DPX 1600	DPX 1600	DPX 630	DPX 630	DPX 630	DPX 630	DPX 630	DPX 250 & (DPX3 250)	DPX 160 & (DPX3 160)	DPX 125
Flexibar Section	6 x 50 x 1 (x2)	10 x 50 x 1	8 x 50 x 1	5 x 50 x 1	6 x 32 x 1	4 x 32 x 1	3 x 32 x 1	2 x 32 x 1	2 x 32 x 1	2 x 24 x 1	2 x 15,5 x 0,8	6 x 9 x 0,8



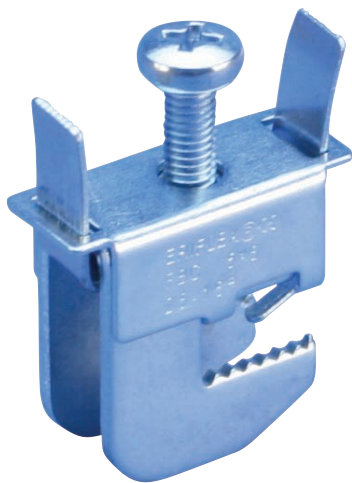
Application pictures: Flexibar directly connected on MCCB's front access connection.

# Recommended Fabrication Procedures

## **ACCESSORIES AND SOLUTIONS FOR CONNECTION**

nVent ERIFLEX offers a wide selection of accessories and solutions to connect Flexibar on different supports types and realize efficient and reliable connections:

- Connection on rigid plain copper bars
- Connections on rigid punched copper bars
- Connection without drilling or punching
- Connection for on-site modification.



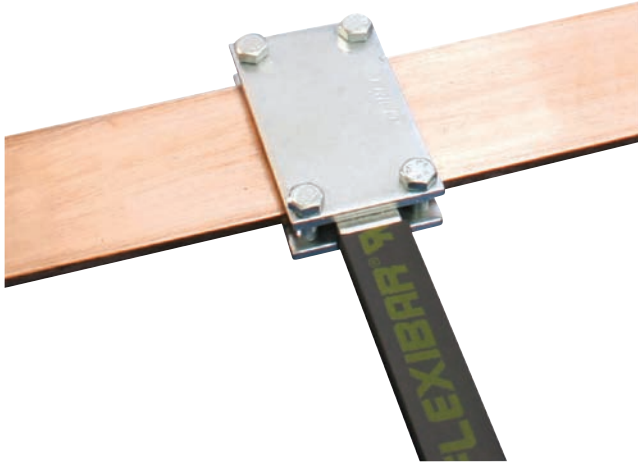
## **CONT-KIT METAL NUTS AND BOLTS CONTACT KIT**

- For optimal electrical connections
- Kit includes 100 bolts, 100 nuts, 200 flat washers and 200 contact/beleville washers
- Kit existing in metric dimension.

## **FBC FLEXIBAR TO BUSBAR CLAMP**

- Very compact clamp for connecting cable conductors or Flexibar to busbar without drilling
- Conductor is clamped with a pressure plate
- Clamps can be mounted and slid into position on busbar prior to connecting conductors
- Connections can be added after busbar has been mounted
- Single screw locks clamp and makes connection
- EAC compliant
- RoHS compliant.

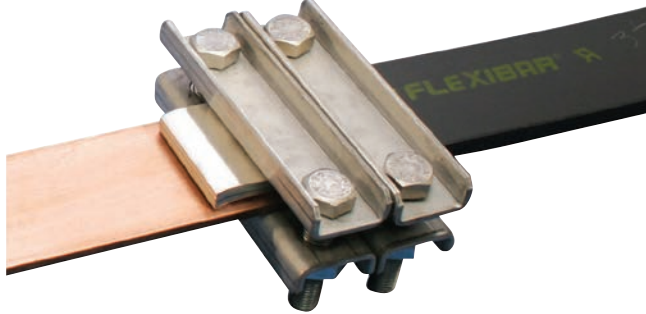
# Recommended Fabrication Procedures



## **FC FLEXIBAR TO BUSBAR CLAMP**

---

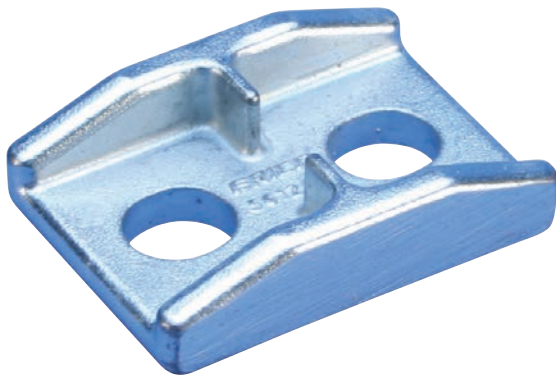
- Connects Flexibar to copper busbar
- Two plates complete with screws
- Allows for excellent electrical contact
- Installs quickly and easily
- Ideal for on site modifications
- RoHS compliant.



## **HCBC HIGH CURRENT BUSBAR CLAMP**

---

- Connects copper busbar to copper busbar, Flexibar or power shunt
- Made with non-magnetic materials for high current connections between Flexibar and rigid busbars such as transformer terminals
- Rigid design assures even contact pressure
- Installs quickly and easily
- Ideal for on site modifications
- RoHS compliant.
- Ideal for on site modifications.



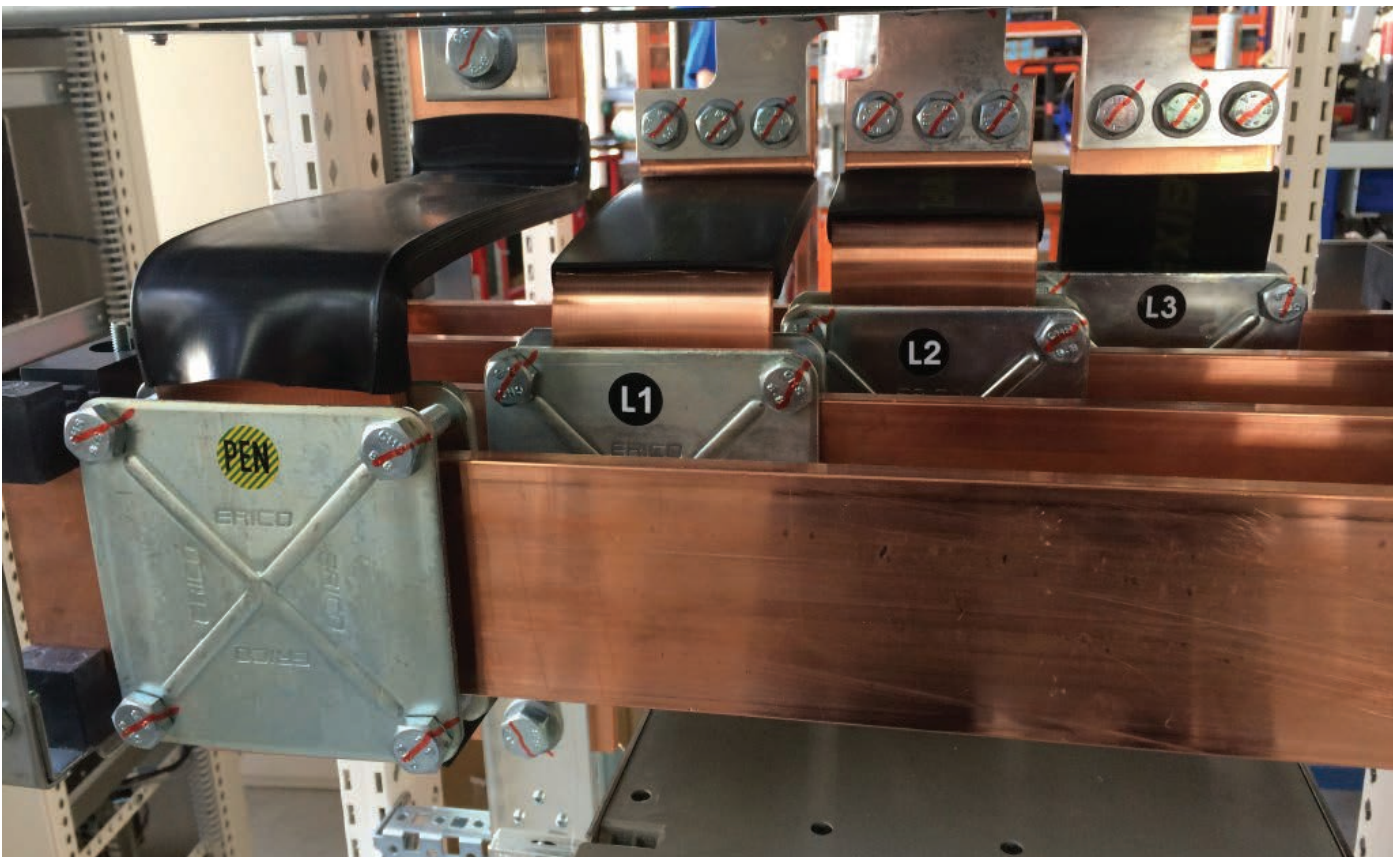
## **QCC FLEXIBAR CLAMP**

---

- Connects Flexibar to punched busbar
- Allows for excellent electrical contact
- Compact, space saving design
- Installs quickly and easily

 See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) for full products data's

# Recommended Fabrication Procedures



Application pictures: Flexibar directly connected on rigid bars with clamps, without drilling or punching.

# Recommended Fabrication Procedures

## FLEXIBAR DIRECT CONNECTION ON POWER & DISTRIBUTION BLOCKS

nVent ERIFLEX offers a wide selection of compact halogen-free power & flame retardant blocks and single pole, two poles, and four pole distribution blocks and a complete range of assembly support products for easy fastening to DIN rails or steel sheet. The blocks offer easy assembly with visual inspection to allow for confirmation of connections to a wide range of conductors including Flexibar. The high fill ratio ensures optimal electrical connectivity even in tight assemblies.



## SINGLE POLE DISTRIBUTION BLOCKS (UD SERIES)

- Directly connect Flexibar on line side
- Tinned copper or tinned aluminum block allows for copper or aluminum conductor connections
- Screw retaining cover is hinged and removable
- Design allows for visual inspection of conductor and confirmation of connection
- Stackable for building multi-pole power blocks
- Easily clips onto DIN rail or mounts to panel with screws
- 95% fill ratio
- Halogen-free a part of the nVent ERIFLEX Advanced Technology range
- RoHS compliant.
- On some model IP 20 slider to ensure positioning IP 20 finger safe features with flat conductors

## POWER BLOCKS (SB SERIES)

- Directly connect Flexibar or insulated power braid on line side
- Compact power block with high short circuit current rating
- Tinned copper or aluminum block allows for copper or aluminum conductor connections
- Screw retaining cover is hinged and removable
- Design allows for visual inspection of conductor and confirmation of connection
- Stackable for building multi-pole power blocks
- Easily clips onto DIN rail or mounts to panel with screws
- Voltage detection and measurement connection
- 95% fill ratio
- Halogen-free a part of the nVent ERIFLEX Advanced Technology range
- RoHS compliant.
- On some model : IP 20 slider to ensure positioning IP 20 finger safe features with flat conductors

# Recommended Fabrication Procedures



## POWER TERMINALS (SBLL & SBLT SERIES)

---

- Tinned copper block allows for copper or aluminum conductor connections
- Accessible studs allow for easy connection of sections of Flexibar or other conductors
- Design allows for visual inspection of conductor and confirmation of connection
- Adjustable transparent cover
- Stackable for building multi-pole power blocks
- Easily clips onto DIN rail or mounts to panel with screws
- SBLEC power terminals fixing accessory required for direct panel mount
- Halogen-free a part of the nVent ERIFLEX Advanced Technology range
- RoHS compliant.



## TDL COMPACT FOUR POLE DISTRIBUTION BLOCK, 400 A

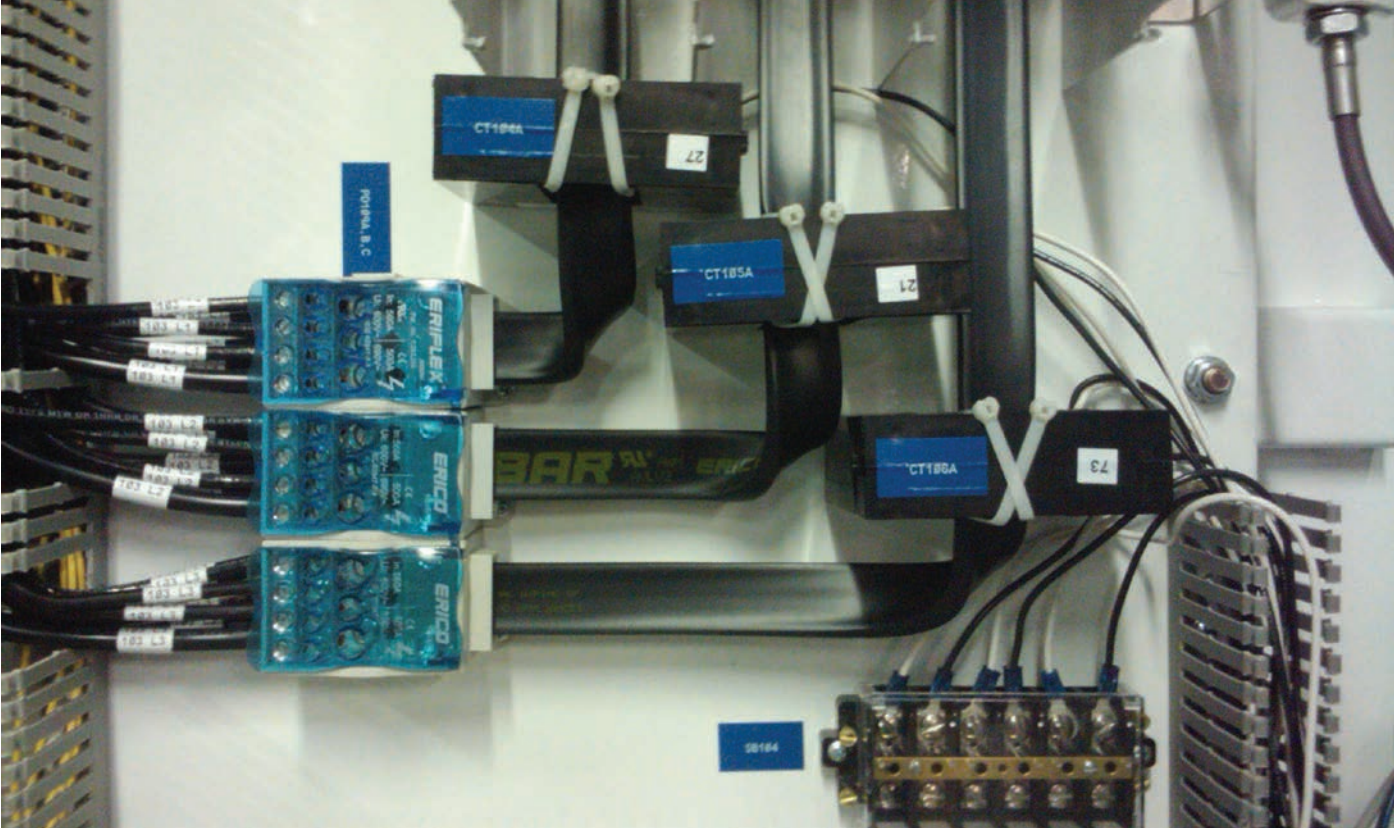
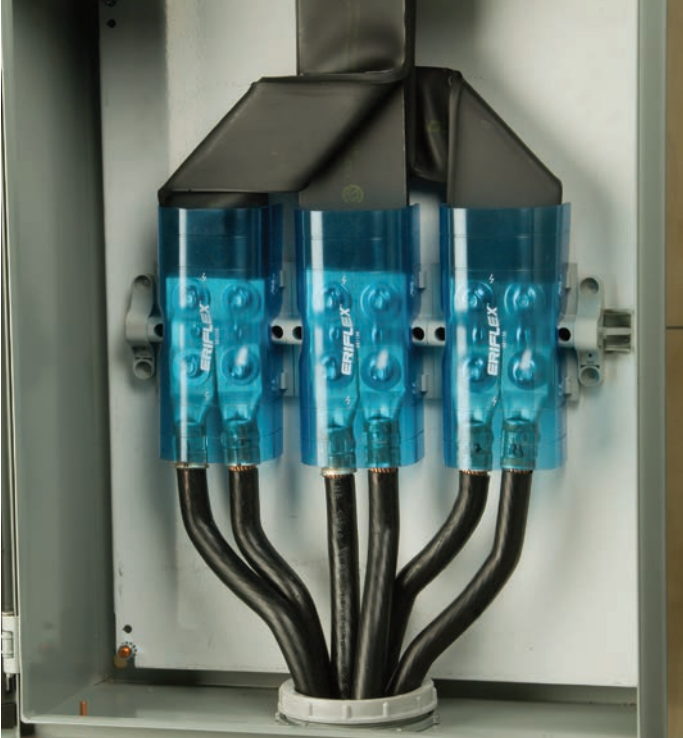
---

- Connect Flexibar, insulated braided conductor or cable with lug on line side
- Tinned copper bars allows for copper or aluminum cable
- Transparent protection covers
- Easy and safe connections
- Easily clips onto DIN rail or mounts to panel with screws
- Solid bars provide reliability
- Input separated from outputs
- Supports wiring from both sides
- Design allows for visual inspection of conductor and confirmation of connection
- Large end terminals
- High percentage of fill ratio
- Wiring with or without terminal
- Halogen-free a part of the nVent ERIFLEX Advanced Technology range
- RoHS compliant.

 See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) for full products data's



# Recommended Fabrication Procedures



Application pictures: Flexibar directly connected on nVent ERIFLEX Power blocks and Distribution blocks.

# Recommended Fabrication Procedures

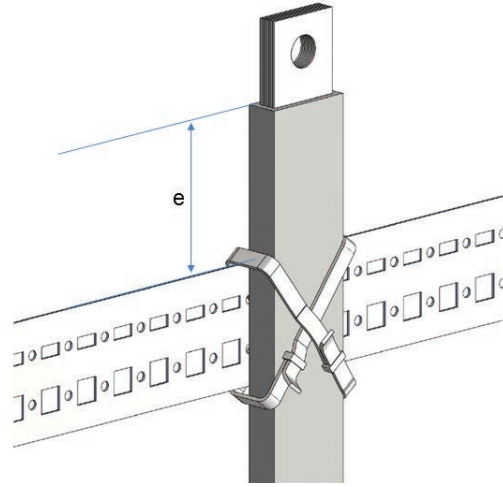
## FIXING/SECURING

According to standards IEC 61439-1, insulated conductors must not rest up against bare live parts or against metallic parts. As Flexibar Advanced and Flexibar Standard Class II certified, they can be touching and fixing directly to any metal parts (no clearance distance needed).

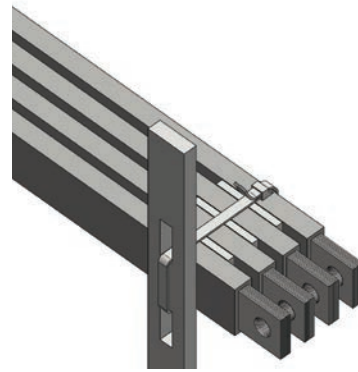
In function of the standard, different minimum creepage distance need to be respected between metallic part and stripped Flexibar part (e).

Flexibar Summum must not be fixed directly on live part and need insulated spacers.

Thanks to the high quality of the Flexibar Advanced and Standard insulation (Class II/reinforced insulation), mutual contact or contact with conductive parts is allowed and there should not be mechanical risk of damage. Consequently, it is not necessary to fix Flexibar Advanced and Standard in absence of sharpe edges or proximity with electrical device.

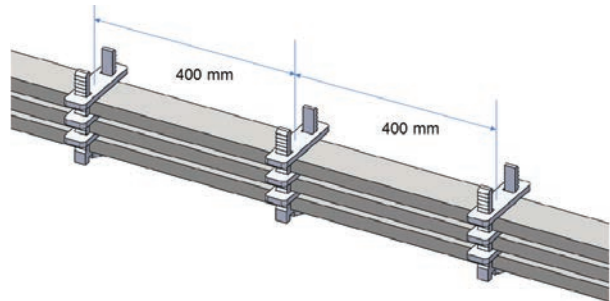


In case of proximity with sharp edges, and as Flexibar is an insulated conductor, unlike a bare solid bar, there is no calculation required for support according to a short-circuit level. Nevertheless Flexibar needs to be maintain to avoid any damaged and assure the protection of the surrounding material in case of a short-circuit current inside the switchboard.



The protection of the sharp edges can be done by rebate seals, rectangular glands, plastic screens, etc.

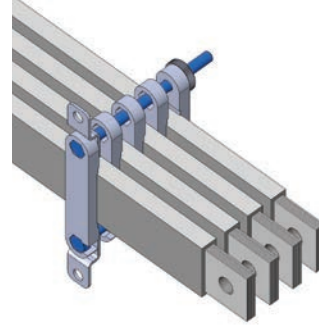
Second solution, we recommend fixed spacers or ties should be secured to the framework every 400 mm, for any level of potential short-circuit.



# Recommended Fabrication Procedures

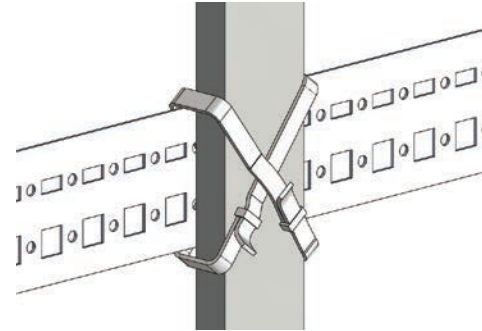
We advise installers to use nVent ERIFLEX spacers (FS, RFS, UFS kit) which improve the aesthetics global feature.

The last spacer should be located as close as possible to the device connection.



In case of plastic tie used, we recommend:

- Tie type 4.5mm minimum width.
- Do not tight tie with tool, but only gently by hand in order to not compromise insulation integrity.
- Do not put tie collar junction on Flexibar corners, but on the plane surface.
- Weight of supported Flexibar should be below tie mechanical resistance.
- If tie need to be removed after Flexibar have been submitted to the temperature close to the maximum admissible of the insulation, a visual inspection need to be performed to check insulation integrity.
- The last tie should be located as close as possible to the device connection.

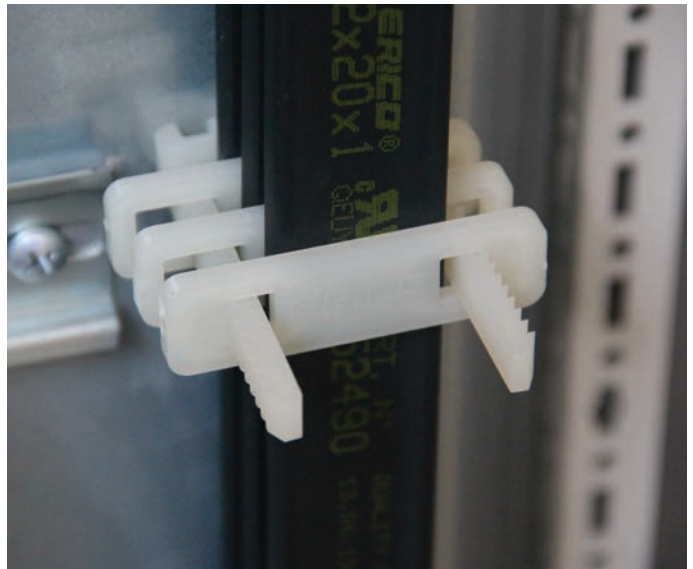
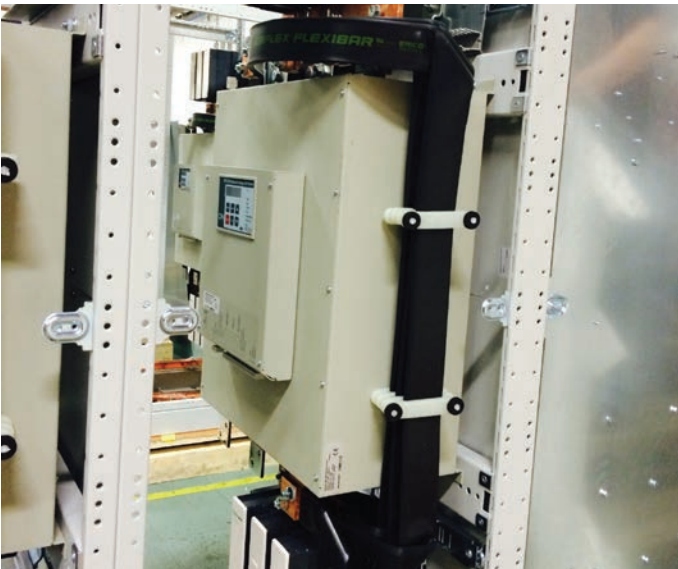
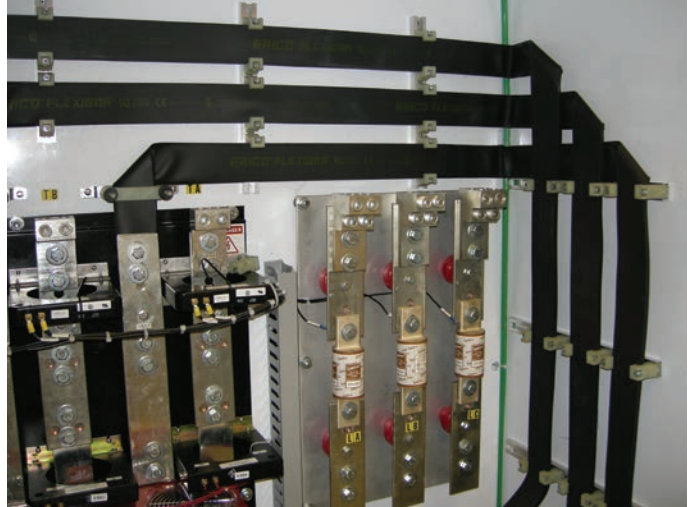
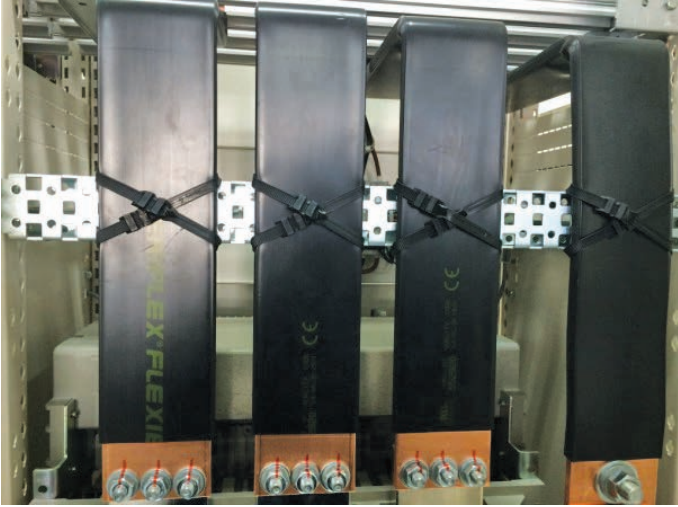


In cases where several Flexibar products are installed in parallel, a minimum distance of a few millimeters is recommended for air cooling. To ensure that conductors are properly ventilated, a space should be left between the flexible bars, at each tie or spacer. Multiple Flexibar per phase shall be spaced with a min adjacent distance of 4mm for ventilation.



 Note: The cooling is better for a rectangular bar standing on its edge.

# Recommended Fabrication Procedures



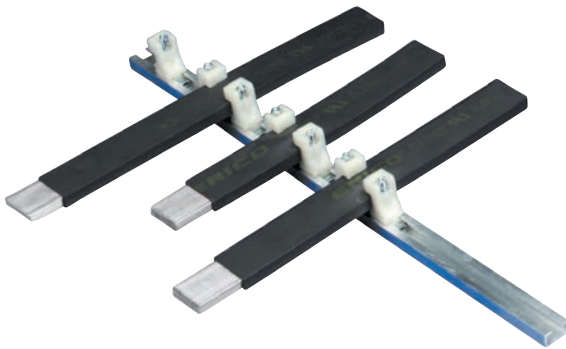
Application pictures: Flexibar fixed/secured with nVent ERIFLEX spacers, clamps and tie.

# Recommended Fabrication Procedures

## ACCESSORIES AND SOLUTION FOR FIXING/ SECURING

---

- nVent ERIFLEX offers a wide selection of accessories and solutions to fix and secure Flexibar on edge position or flat position. Those clamps allow:
- Fixing/Securing without damaging the insulation
- Fixing/Securing with correct spacing for optimum cooling
- Fixing/Securing multiple Flexibar in parallel.



## UFS SUPPORT KIT

---

- Kit includes one rail and 24 retaining blocks
- Create up to three 650 mm (25.6") supports capable of holding four Flexibar
- Retaining blocks are halogen-free
- RoHS compliant
- Conductor thickness: 2 - 8 mm
- Conductor width: 15.5 – 120 mm
- Recommended distance between supports is 400 mm.

## FS SPACER CLAMP

---

- Provides support for Flexibar without damaging the insulation
- Ensures correct spacing for optimum cooling
- Supports up to four conductors in parallel
- Easy to install
- Spacers are halogen-free
- RoHS compliant
- Conductor width: 40 – 100 mm
- Recommended distance between supports is 400 mm.

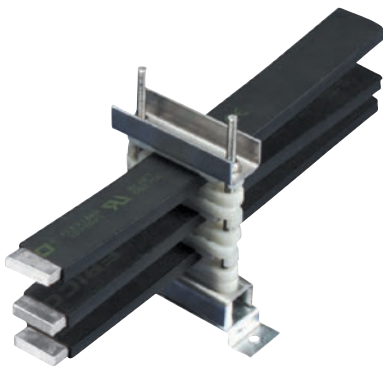
# Recommended Fabrication Procedures



## **FS SPACER CLAMP, SNAP CLOSE**

---

- Provides support for Flexibar without damaging the insulation
- Ensures correct spacing for optimum cooling
- Supports up to four conductors in parallel
- Easy to install
- Halogen-free
- Conductor width: 15.5 – 32 mm
- RoHS compliant
- Recommended distance between supports is 400 mm.

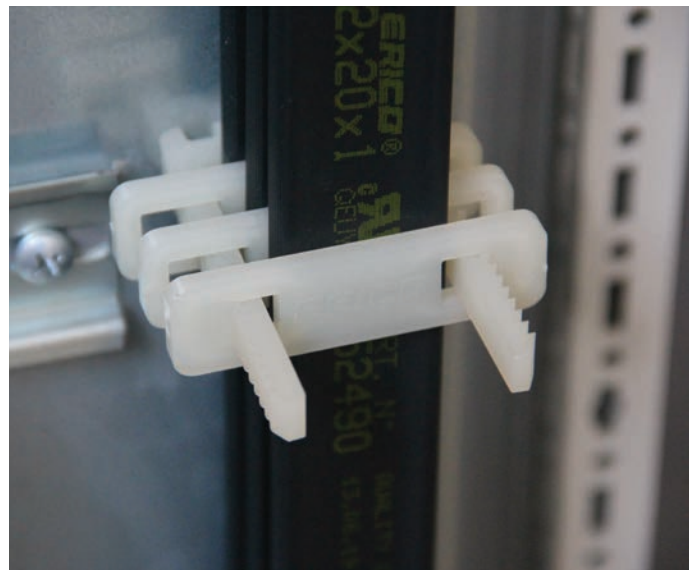
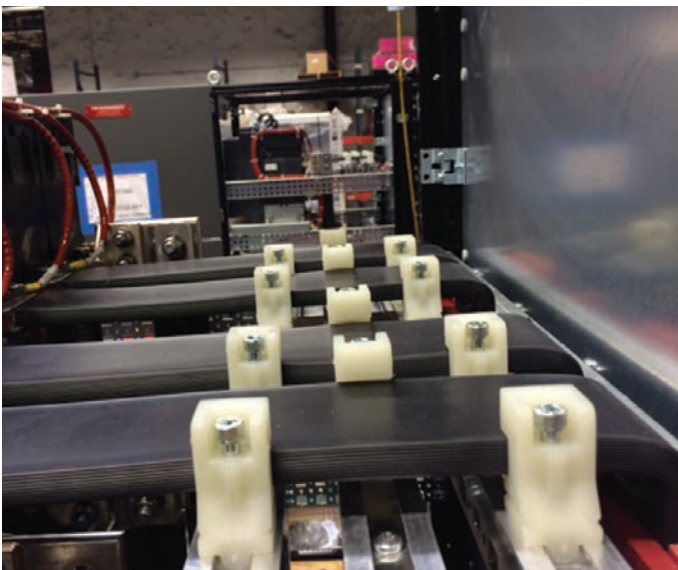


## **RFS REINFORCED SUPPORT**

---

- Supports up to eight conductors in parallel
- Ensures correct spacing for optimum cooling
- Easy to install
- Spacers are halogen-free
- RoHS compliant
- Conductor width: 40 – 100 mm
- Recommended distance between supports is 400 mm.

 See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) for full products data's



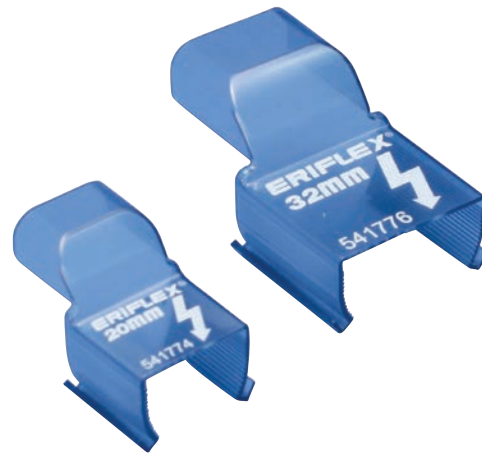
Application pictures: Flexibar fixed/secured with nVent ERIFLEX spacers and clamps.

# Fixing and Securing nVent ERIFLEX Flexibar



## NVENT ERIFLEX END COVERS

- End cover for Flexibar
- Allows for visual inspection of connection
- Easy fitting after fixing
- RoHS compliant
- Material: Polycarbonate
- Flammability rating: UL® 94V-0
- Halogen-free



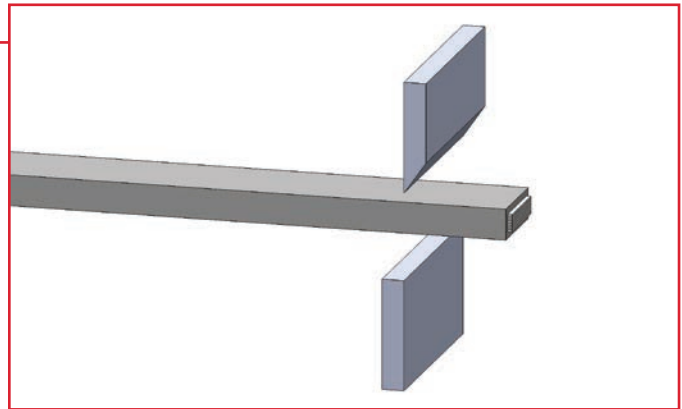
# Recommended Fabrication Tools

## **NVENT ERIFLEX OFFERS A WIDE SELECTION OF MANUAL OR HYDRAULIC TOOLS FOR FLEXIBAR FABRICATION.**

Those dedicated Flexibar tools will help you to:

- Work within safe environment
- Determine the correct position of the cut, bend, fold, punch...
- Minimize the deformation of the laminate
- Not create chips
- Not damage the insulation
- Do several Flexibar links with the same bending radius, always at the same location
- Do a quality product on site or in manufacturing plant.

### **FUNCTION - CUTTING**



### **MFSHT-2 FLEXIBAR MANUAL SHEARING TOOL**

- Cuts Flexibar quickly and accurately without burrs or deformation
- Cuts through the insulation without damaging it
- Maximum Flexibar shearing 5x32x1
- Adjustable abutment for identical and repetitive cuttings
- Abutment and indicator allow for easy cutting of 45° chamfers
- Elastomer edge near the blade helps to prevent jamming from shavings
- Replacement blade available
- RoHS compliant.



# Recommended Fabrication Tools



## **MHYFSHT MANUAL HYDRAULIC FLEXIBAR SHEARING TOOL**

---

- Cuts Flexibar quickly and accurately without burrs or deformation
- Cuts through the insulation without damaging it
- Works with all sizes of Flexibar
- Integrated handles allow for easy portability
- Works without electrical or hydraulic power
- Includes two brackets for mounting to workbench
- Strong mechanical assembly
- Replacement blade available
- RoHS compliant.



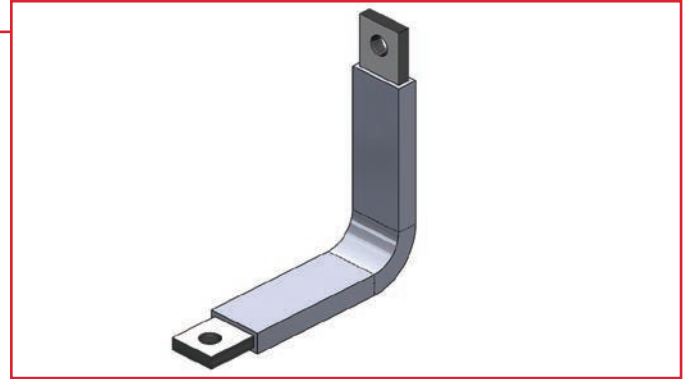
## **HYDRAULIC FLEXIBAR SHEARING TOOL**

---

- Cuts Flexibar quickly and accurately without burrs or deformation
- Cuts through the insulation without damaging it
- Works with all sizes of Flexibar
- Clear plastic shields allow for visual inspection of cutting position
- Strong mechanical assembly
- Replacement blade available
- RoHS compliant.

# Recommended Fabrication Tools

## FUNCTION - BENDING



### MFBT-2 FLEXIBAR MANUAL BENDING TOOL

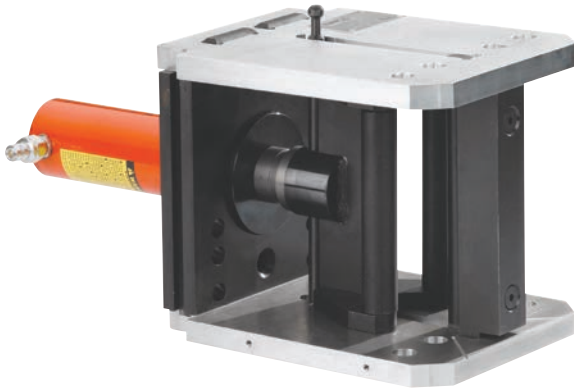
- Allows the user to bend Flexibar into custom shapes for an efficient installation
- Easy-to-use tool bends all sizes of Flexibar quickly without damage to the insulation
- Long handle to apply force during Flexibar bending up to 10x120x1/12x100x1
- Two bending radiuses: 4 mm and 8 mm (0.16" and 0.32")
- Allows for adjustment of the bending angle for repetitive bending
- Robust blue aluminum base with three fixing points
- Adjustable length setting for Flexibar
- Quick Flexibar locking system with no tools required
- RoHS compliant.



### HFBT FLEXIBAR BENDING TOOL

- Allows the user to bend Flexibar into custom shapes for an efficient installation
- Easy-to-use tool bends all sizes of Flexibar quickly without damage to the insulation
- Portable tool can be used on the jobsite or attached to a workbench
- Includes tool box.

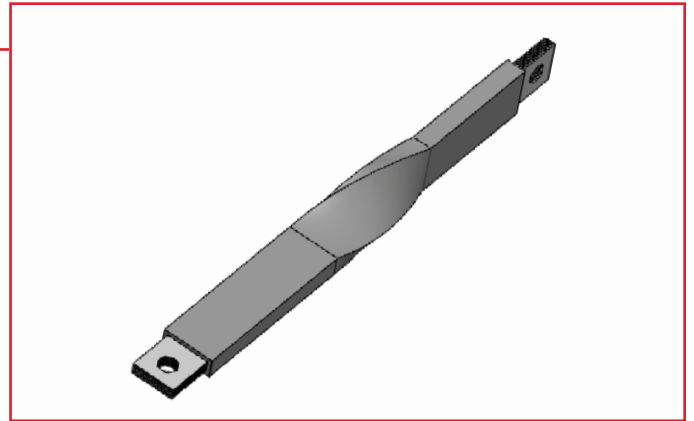
# Recommended Fabrication Tools



## HYDRAULIC FLEXIBLE/NON-FLEXIBLE BUSBAR BENDER

- Works with copper or aluminium busbar and Flexibar
- Multi-function tool creates “V” or “Z” bends and straightens busbar for corrections
- Removable top plate allows for multiple bends on a busbar
- Bottom plate is etched to indicate a 90° bend
- Includes steel bar supports for bending busbar when tool is not fixed to the Hydraulic Flexibar and Busbar Work Center
- RoHS compliant.

## FUNCTION - TWISTING



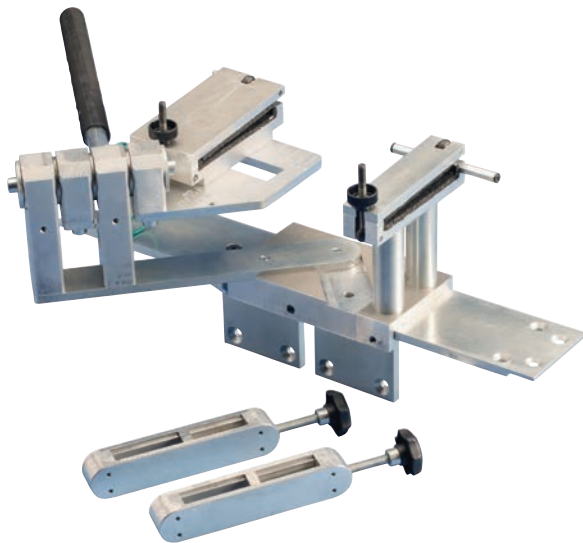
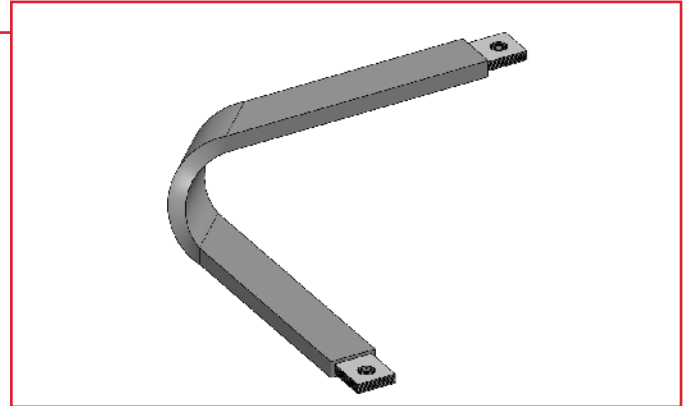
## MFTT-2 FLEXIBAR MANUAL TWISTING TOOL

- Easy-to-use tool twists or changes the plane of Flexibar
- Recommended to hold Flexibar while forming
- RoHS compliant.

# Recommended Fabrication Tools

## FUNCTION - FOLDING

---



### MFF FLEXIBAR FOLDING TOOL STARTER KIT

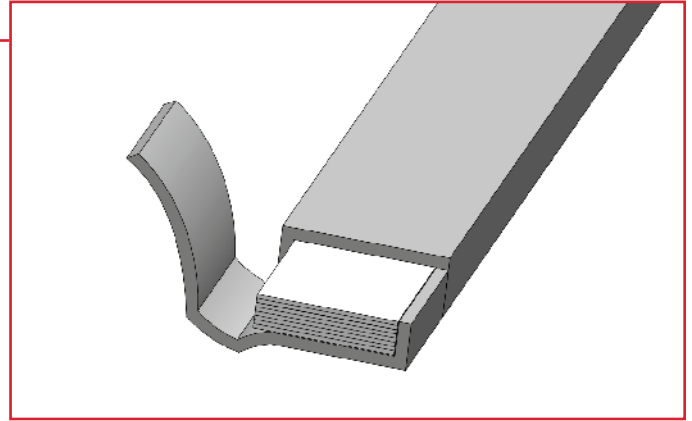
---

- Kit includes folding tool, fixed vice, rail and clamps
- Folds all sizes of Flexibar without damaging the insulation
- Kit allows for L-shape and Z-shape folds
- Additional folding tool components available for making U-shape folds and folding long pieces of Flexibar
- Easy to reproduce many shapes and sizes
- Significantly reduce Flexibar scrap
- Limits heavy Flexibar handling
- Quick and easy setup
- Tool can be easily transported to the job site or remain fixed in a workshop.

# Recommended Fabrication Tools

## FUNCTION - STRIPPING

---



### MFST-2 FLEXIBAR STRIPPING TOOL

---

- Accurately cuts all sides of the Flexibar insulation in a single operation without marking the copper laminates
- Additional blade to safely release the longitudinal cut
- Adjustable blades
- Allows for stripping of short lengths
- Includes two holes for mounting to workbench
- Large abutment quickly and easily adjusts for stripping length setup
- Removable handle
- Robust and ergonomic design
- Replacement blade sets available
- RoHS compliant.



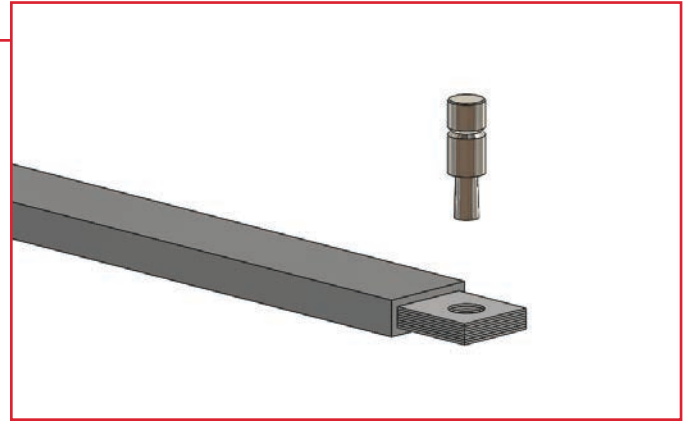
### SOK FLEXIBAR STRIPPING KNIFE

---

- Accurately cuts Flexibar insulation
- Blade protection
- Ergonomic shockproof resin handle.

# Recommended Fabrication Tools

## FUNCTION - PUNCHING



### MFPT FLEXIBAR PUNCHING TOOL

- Works with copper or aluminum busbar and Flexibar up to 6 mm thickness
- Punches flat and clean hole edges
- Quick and easy installation and setup
- Accurately punch Flexibar in a single operation without marking the copper laminates
- Quick setup with interchangeable punch and die system
- Large range of round punches and dies available
- Robust blue steel base with four fixing points
- Adjustable length setting for Flexibar, up to 90mm
- Removable handle
- Portable tool can be used on the jobsite or attached to a workbench
- RoHS compliant.

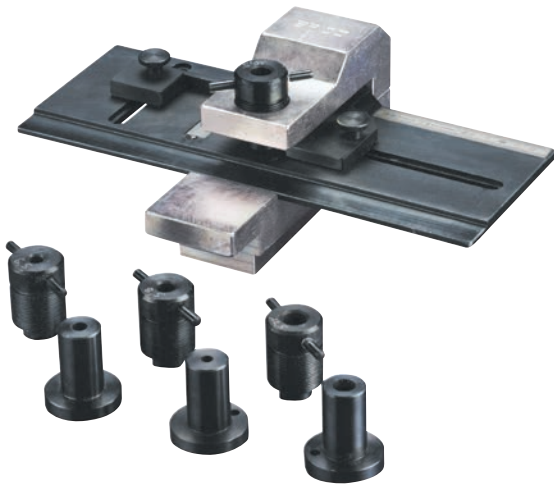
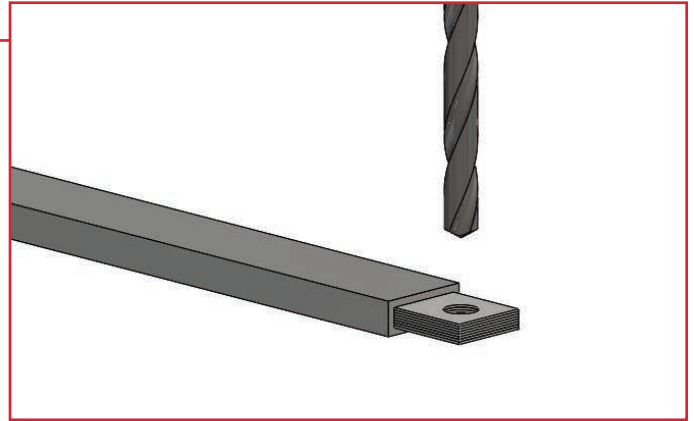


### HYDRAULIC FLEXIBLE/NON-FLEXIBLE BUSBAR PUNCHER

- Works with copper or aluminium busbar and Flexibar
- Punches flat and clean hole edges
- Punch pip to adjust the hole position
- Quick setup with interchangeable punch and die system
- Large range of round and oval punches and dies available
- Can be tilted at a 45° angle for easier punching of formed busbar
- Calibrated side and depth gauge and stop
- Strong mechanical assembly
- RoHS compliant.

# Recommended Fabrication Tools

## FUNCTION - DRILLING



### FLEXIDRILL DRILL GUIDE

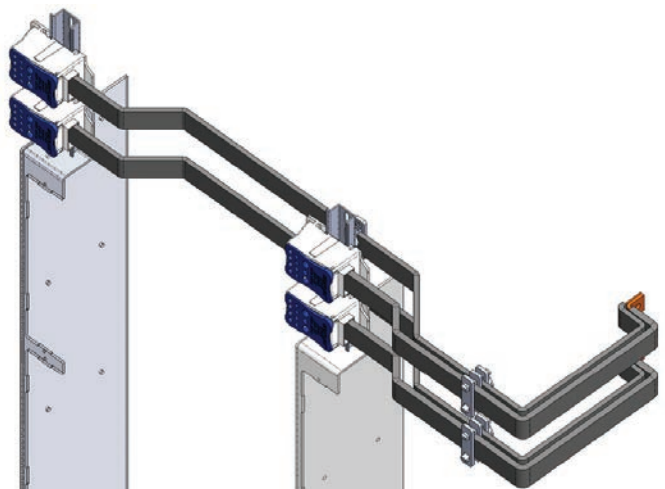
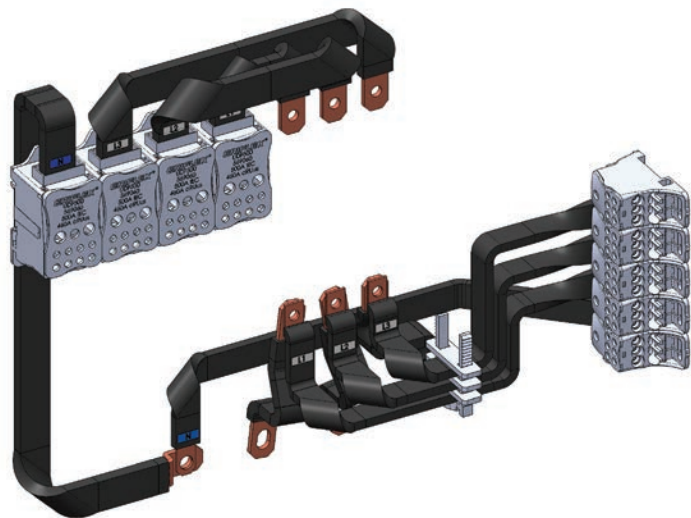
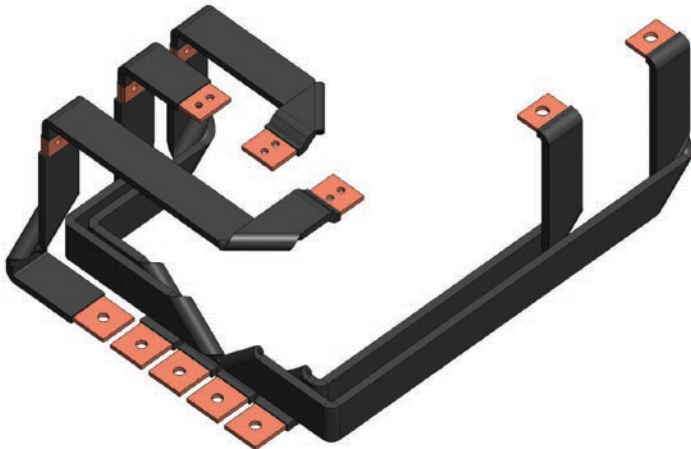
- Guide for drilling holes into Flexibar, PBC Braided Power Shunts and PPS Presswelded Power Shunts
- Includes dies for multiple diameters
- Adjustable guides allow for multiple hole center to hole center distances
- RoHS compliant.

**i** See our web site, [nVent.com/ERIFLEX](http://nVent.com/ERIFLEX) for full products data's and video's  
Tools video's also available from our nVent ERIFLEX YouTube channel.  
Those tools been developed for nVent ERIFLEX Flexibar only. Other Flexible busbar brand may not resist to some radius provided by those tools.

# Made to Order Solutions (MTO)

## FLEXIBAR CUSTOM SOLUTIONS (MADE TO ORDER)

nVent ERIFLEX can provide preformed Flexibar configurations to your drawing specifications. Flexibar can be cut, punched, twisted or bent to address your most challenging panelboard designs and production scheduling requirements. Give nVent ERIFLEX your low voltage connection challenges!





# Applications Pictures



# Applications Pictures



# Applications Pictures



# nVent ERIFLEX Software

## DEDICATED NVENT ERIFLEX SOFTWARE AVAILABLE

nVent has designed an interactive software that allows drawing your technical panel layout with all components and relevant information on them.

The software is developed according to the new IEC 61439-1 standard. Inside, you will discover: updated pricing, products information and project calculator.

Whether you're interested in making a complete low-voltage busbar system, a distribution kit, or if you need to determine a

flexible connection with nVent ERIFLEX Flexibar, you can trust nVent ERIFLEX software to help simplify the process.

In fact, the software will provide you with technical and commercial datasheets dedicated to your project.

For more information or to request your personal login information, contact your local nVent representative or visit [eriflex-configurator.nvent.com/eriflex](https://eriflex-configurator.nvent.com/eriflex)

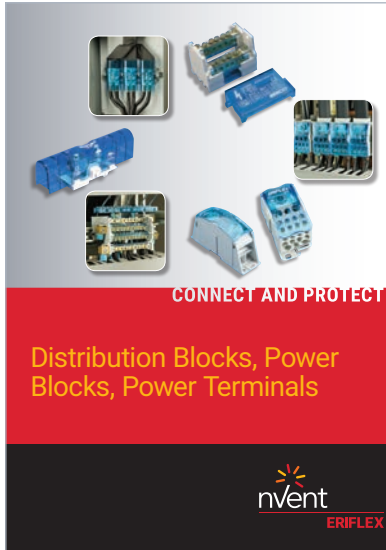
### A COMPLETE SOLUTION FOR:

- Optimal design
- Standard compliance
- Cost effective
- Quality environment

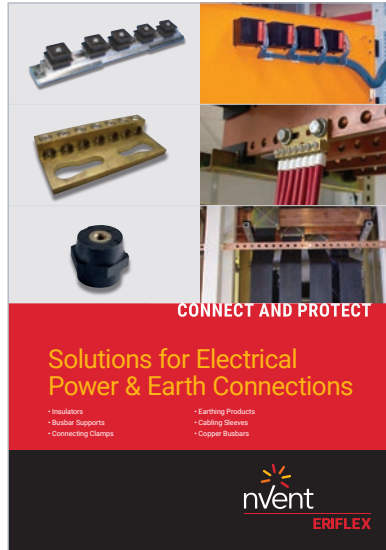
<https://eriflex-configurator.nvent.com/eriflex/>



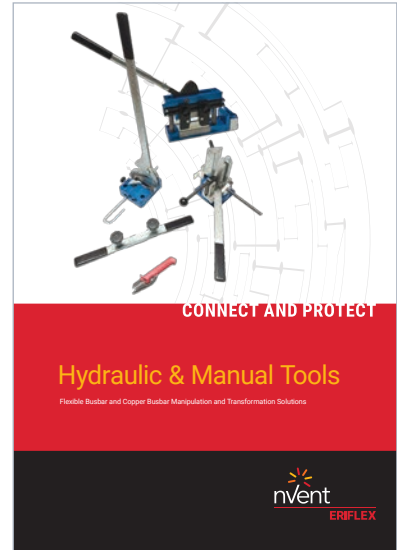
# Other nVent ERIFLEX Literature



**DISTRIBUTION BLOCKS, POWER BLOCKS AND DISTRIBUTION TERMINAL**



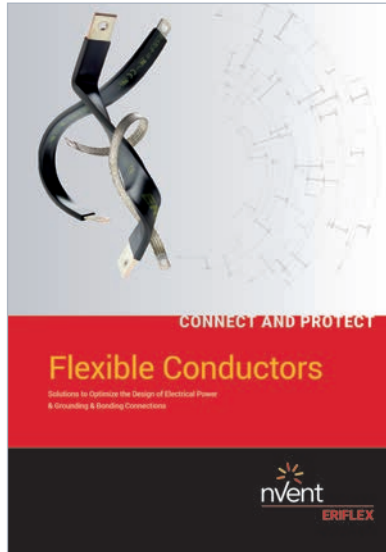
**SOLUTIONS FOR ELECTRICAL POWER AND EARTH CONNECTION**



**HYDRAULIC AND MANUAL TOOLS**



**NVENT ERIFLEX AND THE NEW IEC 61439 SERIES**

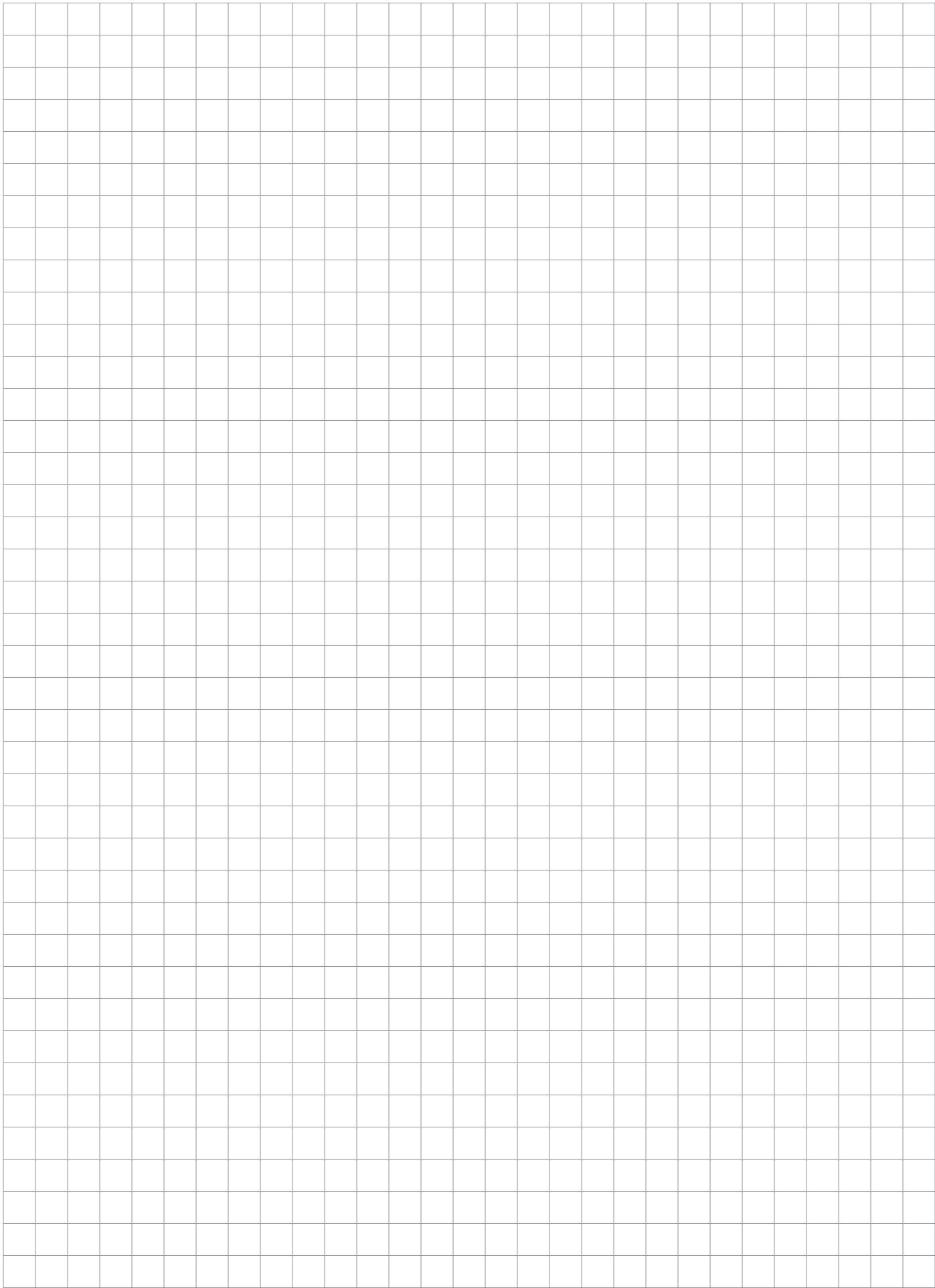


**FLEXIBLE CONDUCTOR**



**READY-TO-USE POWER CONDUCTORS IBS & IBSB ADVANCED TECHNICAL GUIDE**





Our powerful portfolio of brands:

**CADDY   ERICO   HOFFMAN   RAYCHEM   SCHROFF   TRACER**



[nVent.com/ERIFLEX](https://www.nVent.com/ERIFLEX)