

**Convolute Rolled Tube Products – Phenolic Resins, Paper Substrates**

<b>Phenolic Resins – Paper Substrates</b>				
<b>Grade</b>	<b>RT610</b>	<b>RT628</b>	<b>RT629</b>	<b>RT630</b>
Resin System	Phenolic			
NEMA <sup>1</sup>	X	XX		XXX
Color	NA/BK	NA	NA/BK	NA/BK

Inside Diameter		Wall Thickness <sup>A,B,C</sup>		Outside Diameter	Maximum
Minimum <sup>F</sup>	Maximum	Minimum	Maximum	Maximum	Length <sup>D</sup>
0.094	0.187	0.031	0.203	0.500	18
0.188	0.374	0.031	0.250	0.750	36
0.375	0.624	0.031	1.000	2.625	48
0.625	1.249	0.031	1.000	3.250	48
1.250	2.999	0.031	1.000	5.000	48
3.000	4.874	0.047	1.000	6.875	48
4.875	8.999	0.062	1.000	11.000	48
9.000	23.999	0.094	1.000	26.000	48
24.000	29.999	0.125	1.000	32.000	48
30.000	48.000	0.156	1.000	50.000	48

### Convolute Rolled Tube Products – All Resins, Cotton Fabric Substrates

Fine Weave (linen) Cotton Fabric Substrate								
Grade	RTB320	RTB320D	RTB320X	RTB320Z	RTB324	RT325	RTB326	RTB329
Resin	Phenolic				Phenolic – PTFE	Phenolic – Graphite	Epoxy	Melamine
NEMA	LE	---	LE		---	---	---	---
Color	NA/BK	BK	NA			BK	NA	

Inside Diameter		Wall Thickness <sup>A,B,C</sup>		Outside Diameter	Maximum
Minimum <sup>F</sup>	Maximum	Minimum <sup>F</sup>	Maximum	Maximum <sup>F</sup>	Length <sup>DE</sup>
0.094	0.187	0.031	0.203	0.500	24
0.188	0.374	0.031	0.250	0.750	36
0.375	0.624	0.031	1.000	2.625	48
0.625	1.249	0.031	1.500	3.750	48
1.250	2.999	0.031	1.875	7.500	48
3.000	4.874	0.047	2.375	7.500	48
4.875	8.999	0.062	3.000	15.000	48
9.000	23.999	0.094	3.500	31.000	48
24.000	29.999	0.125	5.000	40.000	48
30.000	48.000	0.156	5.000	58.000	48

Medium Weave (canvas) Cotton Fabric Substrate			
Grade	RT310	RT315	RT342
Resin System	Phenolic	Phenolic – Graphite	Phenolic
NEMA <sup>1</sup>	C	---	C
Color	NA/BK	BK	NA/BK

Inside Diameter		Wall Thickness <sup>A,B,C</sup>		Outside Diameter	Maximum
Minimum <sup>F</sup>	Maximum	Minimum	Maximum	Maximum	Length <sup>D</sup>
0.500	0.624	0.047	1.000	2.625	48
0.625	1.249	0.047	1.500	3.750	48
1.250	2.999	0.047	1.875	7.500	48
3.000	4.874	0.062	2.375	7.500	48
4.875	8.999	0.062	3.000	15.000	48
9.000	23.999	0.094	3.500	31.000	48
24.000	29.999	0.125	5.000	40.000	48
30.000	48.000	0.156	5.000	58.000	48

**Convolute Rolled Tube Products – All Resins, Glass Fabric Substrates**

<b>Epoxy Resins – Glass Fabric Substrates</b>							
Grade	RT130	RT130M	RT130X	RT500	RT500F	RT500M	RT500X
NEMA <sup>1</sup>	FR-4			G-10			
Color	NA/BK <sup>2</sup>	NA/WH	NA				

<b>Epoxy Resins – Glass Fabric Substrates (continued)</b>								
Grade	RT511	RT511F	RT511M	RT520M	RT520X	RT521M	RT521X	RT571
NEMA <sup>1</sup>	G-10 <sup>3</sup>			G-10				
Color	NA							

<b>Phenolic, Melamine and Silicone Resins – Glass Fabric Substrates</b>									
Grade	RT504	RT504F	RT505	RT505F	RT507	RT507F	RT507L	RT509	RT509F
Resin System	Phenolic		Melamine		Silicone			Melamine	
NEMA <sup>1</sup>	G-3 <sup>4</sup>		G-5		G-7			G-9	
Color	NA								

Inside Diameter		Wall Thickness <sup>A,B,C</sup>		Outside Diameter	Maximum
Minimum <sup>F</sup>	Minimum	Minimum <sup>F</sup>	Maximum <sup>F</sup>	Maximum	Length <sup>D</sup>
0.094	0.187	0.031	0.203	0.500	18
0.188	0.374	0.031	0.250	0.750	36
0.375	0.624	0.031	1.000	2.625	48
0.625	1.249	0.031	1.000	3.250	48
1.250	2.999	0.031	1.000	5.000	48
3.000	4.874	0.047	1.000	6.875	48
4.875	8.999	0.062	1.000	11.000	48
9.000	23.999	0.094	1.000	26.000	48
24.000	29.999	0.125	1.000	32.000	48
30.000	48.000	0.156	1.000	50.000	48

<p><b>I. Special Size Exceptions – (For tables above)</b></p>
<p><b>A.</b> Walls less than 0.031" must be cleared by Department Manager for capability and cost.</p>
<p><b>B.</b> Walls greater than 1.0" for paper, glass (except RT571) and some special cotton based materials, must be cleared by Department Manager.</p>
<p><b>C.</b> Specifying Inside Diameter and Wall Thickness is not offered in any grade where the outside of the tube is unfinished or requires lathe turning.</p>
<p><b>D.</b> Supplied at:  Random Length = No lengths less than 12" on a 18", 18" on a 24", 30" on a 36" or 42" on a 48" standard length.  Non-Trimmed is considered a random length but not trimmed to allow for maximum customer yield.  Minimum Length is considered the specified length with plus or minus 1.000" allowance  Cut-To-Length is: (Tube must be a finished OD)  6" - 48" cut length with maximum Outside Diameter of 0.250" - 5.000";  Tolerance of <math>\pm 0.125</math>" (May cut all – 0.250" or all + 0.250")  12" - 48" cut length with maximum Outside Diameter of 5.001" - 18.000";  Tolerance of <math>\pm 0.250</math>" (May cut all – 0.500" or all + 0.500")  18" - 48" cut length with maximum Outside Diameter of 18.001" - 24.000";  Tolerance of <math>\pm 0.250</math>" (May cut all – 0.500" or all + 0.500")  All grades of micro ID tubing (less than 0.188" ID) are offered as random length only.  RT571 is offered in random length or cut-to-length only.  Maximum Outside Diameter is 36.000" for trimmed length.  Maximum Wall for any trimmed tube is 4.0"</p>
<p><b>E.</b> RTB320Z (Maximum Tube Length of 24" with a Nominal Length of 22")</p>
<p><b>F.</b> Additional Restrictions and Restricted Grades:  <b>PAPER TABLE – Maximum OD of 0.625"</b> with IDs less than 0.250".  RT628 (<b>Maximum ID 24.000"</b>)  <b>LINEN TABLE – Maximum OD of 0.625"</b> with IDs less than 0.250".  RT325 (<b>Minimum ID 0.500"</b>)  RTB320 and RTB329 (<b>Minimum ID 0.250"</b>)  RTB320D, RTB320X, RTB324 and RTB326 (<b>Minimum ID 0.375"</b>)  RTB320X (<b>Maximum ID 24.000"</b>).  RTB320Z (<b>Maximum ID 1.000"</b>).  IDs 2.000" to 3.000" with Wall Thicknesses less than 0.047" are only offered in <b>RTB320 or RTB329</b>, at random or non-trimmed lengths.  <b>CANVAS TABLE –</b>  RT310 and RT315 (<b>Minimum ID 0.750"</b>, <b>Minimum Wall Thickness 0.125"</b>).  <b>GLASS TABLE – Maximum OD of 0.625"</b> with IDs less than 0.250".  RT130M, RT500M, and RT511M (<b>Minimum ID 0.312"</b>).  RT520M and RT521M (<b>Minimum ID 0.375"</b>).  RT130M, RT500M, RT511M, RT520M and RT521M (<b>Minimum Wall Thickness of 0.094 for Inside Diameters Ranging from 0.312" – 0.749"</b>), (<b>Minimum Wall Thickness of 0.062" for Inside Diameters Ranging from 0.750" – 1.254"</b>).  RT130, RT500, RT504 and RT511 (<b>Minimum ID 0.750"</b>, <b>Minimum Wall Thickness 0.062"</b>).  RT505, RT507 and RT509 (<b>Minimum ID 0.500"</b>).  RT507L (<b>Minimum ID 0.312"</b>, <b>Maximum ID 3.000"</b>).  RT571 (<b>Minimum ID 0.750"</b>, <b>Minimum Wall 0.125"</b>, <b>Maximum Wall 2 Times Diameter</b>).  IDs 2.000" to 3.000" with Wall Thicknesses less than 0.047" are only offered in <b>RT500F, RT500X, RT511F or RT520X</b>, at random or non-trimmed lengths.  Foil Lined Tubes are offered in RT500M or RT511M with a <b>Minimum Wall of 0.125"</b> and Finished Outside.</p>

<b>II. Outside Diameter – Available Finishes</b>		
Outside Diameter		
Minimum	Maximum	Finish <sup>a</sup>
0.250	9.000	Centerless Ground <b>(Standard)</b>
9.001	24.000	As Wound <b>(for Lathe Turned, contact Customer Service)</b>
24.001	Maximum	As Wound <b>(No Finishing Available)</b>
<sup>a</sup> Special Finish Requirements must be cleared by Department Manager and noted on manufacturing order.		

NOTE: Contact Customer Service for sizes and tolerances not listed. Micro ID Tubing (IDs less than 0.187") is offered in RTB320X, RTB320Z, RT500X, RT520X, RT629 and RT630. Industrial Standards related to tolerance, finish and workmanship is assumed, unless otherwise specified. Walls over .500" are subject to check marks and/or cracks in the wall. Oil stabilized post cure (secondary cure), identified as grades with an "S" suffix, is available with any phenolic resin grades (Maximum raw OD 24.000"). Forced air post cure (secondary cure), identified as grades with an "H" suffix, is available with any resin grade excluding Melamine.

<sup>1</sup> For information on Specifications and Standards, see "Tube – Specification Cross Reference".

<sup>2</sup> RT130 black is subject to availability or minimum order quantity.

<sup>3</sup> NEMA Standard LI-1 and MIL-I-24768 do not recognize a high temperature epoxy glass convolute rolled tube form, but, these materials are manufactured with a high temperature epoxy resin system, commonly used for NEMA G-11 and MIL-I-24768/27, type GEB sheet products, and do have improved thermal properties at elevated temperatures.

<sup>4</sup> G-3 tube grades, although a recognized form NEMA, ASTM and MIL-I-24768 standards, has no criteria, and is only defined in IEC 61212-3-1; grade PF-GC-21.