

Flexible Laminates  
Myoflex® Product Range

## We Enable Energy

As one of the oldest industrial companies in Switzerland, founded in 1803, we focus on products and systems for power generation, transmission and distribution, rotating machines and mechanical engineering. Von Roll is a global market leader for insulation products and the only company to offer the complete range of insulation products, composites, consulting, tests and services for the electrotechnical industry.

For more than 100 years, we have been making outstanding contributions to this market, developing a number of highly innovative products that have enabled both steady increases in power output and smaller and more compact machines.

### Customers enjoy the following benefits:

- » One single source for all insulating materials
- » Thorough expertise from power generation and transmission to its efficient utilization
- » Proven compatibility for system components
- » Testing at Von Roll of both materials and systems
- » Consulting for applications and technologies
- » Training in insulation materials and systems

The flexible laminate products from Von Roll are high-quality products, registered under the trade name Myoflex®. Myoflex® materials are manufactured by laminating insulation plastic films with non-wovens, or paper materials. The high quality of this lamination is a result of the adhesive formulation and the dedicated work and development of our experienced chemical engineers.

Multi-layer insulation laminates include two or three layers. The layer in the middle consists of polyester or polyimide. Combination of materials enables different characteristics, optimized properties and functionality of laminates, such as:

- » Ability to work under different operating temperatures
- » An optimized tensile strength and stiffness of material
- » An increased resistance to breakdown voltage
- » An improved capacity for impregnation



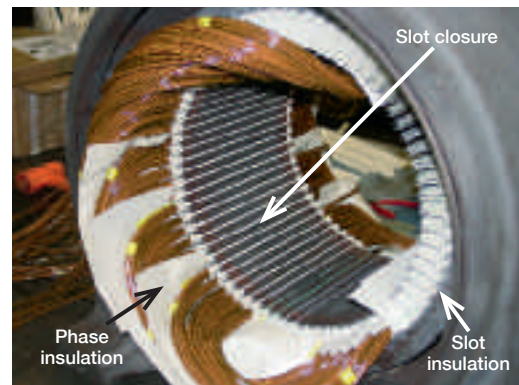
# Flexible Laminates from Von Roll

| Description   | Properties  | End uses  |
|---|---|---|
| <b>DM or DMD: biplex or triplex laminates with polyester film and non-woven polyester felt</b>  |   |   |
| Laminated product made with the coupling of polyester non-woven felt with polyester film. Biplex or triplex laminate. The polyester felt is used to improve the thermal aging performance of the polyester film.                              | Overall performance of the laminates is achieved by saturating the polyester felt with synthetic resins. Triplex PVSH is rated 180°C and is fully saturated with a high thermal resistant adhesive. Polyester film thickness increases product rigidity and dielectric performance. | Suitable for thermal classes 130°C and 155°C for rotating machines and transformer applications<br>» slot insulations<br>» phase insulations<br>» interlayer insulations  |
| <b>NM or NMN: biplex or triplex laminates with Nomex®<sup>1)</sup> paper and polyester film</b>   |   |   |
| Laminated product made with the coupling of Nomex® <sup>1)</sup> paper with polyester film. Biplex or triplex laminates. Nomex® <sup>1)</sup> is used to improve the thermal performance up to 220°C when requested.                          | Overall performance of the laminates is the thermal resistance up to 180°C. Polyester film and Nomex® <sup>1)</sup> paper offer both strong mechanical resistance and excellent electrical properties.  | Suitable for thermal classes 155°C and 180°C for rotating machines and transformer applications<br>» slot insulations<br>» phase insulations<br>» interlayer insulations  |
| <b>NK, NKH, NHN: biplex or triplex laminates with Nomex®<sup>1)</sup> paper and polyimide film (Kapton®<sup>1)</sup>)</b>   |   |   |
| Laminated product made by coupling Nomex® <sup>1)</sup> paper with polyimide or Kapton® <sup>1)</sup> film. Biplex or triplex laminates. Both component assemblies are used for extreme high temperature insulation (> 200°C) when requested. | Overall performance of the laminates is the thermal resistance up to 220°C.   | Suitable for thermal classes 200°C and 220°C for rotating machines and transformer applications.<br>» slot insulations<br>» phase insulations<br>» interlayer insulations |

<sup>1)</sup> Nomex® and Kapton® are registered trademarks of DuPont®



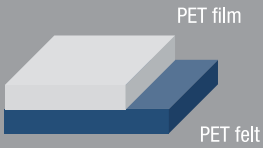
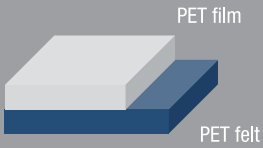
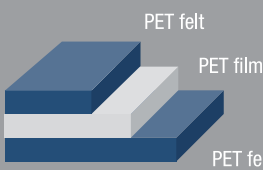
Intermediate insulation of transformer



Stator insulation

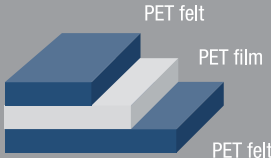
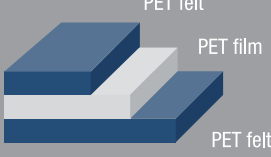
# Myoflex® Flexible Laminates

with polyester film and non-woven polyester felt

|   | Product name           | Generic name | Construction                   | Product structure   | Total thickness          | Treatment   |
|---|------------------------|--------------|--------------------------------|---|--------------------------|-------------|
|   |                        |              |                                | <b>mils</b>   | <b>mm</b>                |             |
|    | DM 70<br>Myoflex® PV/1 | DM           | PET felt / PET film            | 2/1   | 0.08                     | Unsaturated |
|   |                        |              |                                | 2/2   | 0.10                     |             |
|   |                        |              |                                | 2/4   | 0.16                     |             |
|   |                        |              |                                | 2/5   | 0.19                     |             |
|   |                        |              |                                | 2/6   | 0.20                     |             |
|   |                        |              |                                | 2/7.5   | 0.24                     |             |
|   |                        |              |                                | 2/10  | 0.30                     |             |
|   |                        |              |                                | 2/12  | 0.35                     |             |
|   |                        |              |                                | 2/14  | 0.40                     |             |
|   |                        |              |                                |  | DM 100<br>Myoflex® PVS/1 |             |
| 2/7.5   | 0.24                   |              |                                |   |                          |             |
| 2/10  | 0.30                   |              |                                |   |                          |             |
| 2/12  | 0.36                   |              |                                |   |                          |             |
| 2/14  | 0.40                   |              |                                |   |                          |             |
|  | DMD 70<br>Myoflex® PV  | DMD          | PET felt / PET film / PET felt | 2/1/2   | 0.13                     | Unsaturated |
|   |                        |              |                                | 2/2/2   | 0.15                     |             |
|   |                        |              |                                | 2/3/2   | 0.18                     |             |
|   |                        |              |                                | 2/4/2   | 0.20                     |             |
|   |                        |              |                                | 2/5/2   | 0.23/0.25                |             |
|   |                        |              |                                | 2/6/2   | 0.26                     |             |
|   |                        |              |                                | 2/7.5/2   | 0.30                     |             |
|   |                        |              |                                | 2/10/2  | 0.35                     |             |
|   |                        |              |                                | 2/12/2  | 0.41                     |             |
|   |                        |              |                                | 2/14/2  | 0.45                     |             |
|   |                        |              |                                | 3/1/3   | 0.19                     |             |
|   |                        |              |                                | 3/2/3   | 0.21                     |             |
|   |                        |              |                                | 3/3/3   | 0.24                     |             |
|   |                        |              |                                | 3/5/3   | 0.29                     |             |
|   |                        |              |                                | 3/7.5/3   | 0.34                     |             |
|   |                        |              |                                | 3/10/3  | 0.41                     |             |
|   |                        |              |                                | 3/12/3  | 0.45                     |             |
|   |                        |              |                                | 3/14/3  | 0.51                     |             |
|   |                        |              |                                | 5/3/5   | 0.33                     |             |
|   |                        |              |                                | 5/5/5   | 0.35                     |             |
| 5/10/5  | 0.49                   |              |                                |   |                          |             |



| PET film thickness | Weight | Yield  | Tensile strength |        | Breakdown voltage | Thermal class | Advantages / key applications   |
|--------------------|--------|--------|------------------|--------|-------------------|---------------|---|
|                    |        |        | DM               | MD     |                   |               |   |
| µm                 | g/sqm  | sqm/kg | > N/cm           | > N/cm | > KV              | °C            |   |
| 23                 | 75     | 13.30  | 40               | 50     | 4.5               | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Better absorption of varnishes and resins |
| 50                 | 110    | 9.09   | 80               | 70     | 6                 |               |   |
| 100                | 180    | 5.56   | 140              | 130    | 8                 |               |   |
| 125                | 210    | 4.76   | 160              | 150    | 10                |               |   |
| 150                | 250    | 4.00   | 180              | 170    | 12                |               |   |
| 190                | 300    | 3.33   | 210              | 190    | 15                |               |   |
| 250                | 390    | 2.56   | 300              | 270    | 18                |               |   |
| 300                | 465    | 2.15   | 360              | 330    | 20                |               |   |
| 350                | 520    | 1.92   | 400              | 370    | 22                |               |   |
| 125                | 220    | 4.55   | 180              | 170    | 10                | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion          |
| 190                | 310    | 3.23   | 220              | 200    | 15                |               |   |
| 250                | 400    | 2.50   | 290              | 280    | 19                |               |   |
| 300                | 470    | 2.13   | 370              | 340    | 21                |               |   |
| 350                | 530    | 1.89   | 410              | 380    | 23                |               |   |
| 23                 | 125    | 8.00   | 60               | 40     | 5                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Better absorption of varnishes and resins |
| 50                 | 160    | 6.25   | 90               | 80     | 7                 |               |   |
| 75                 | 198    | 5.05   | 120              | 105    | 8                 |               |   |
| 100                | 230    | 4.35   | 130              | 125    | 9                 |               |   |
| 125                | 265    | 3.77   | 180              | 155    | 10                |               |   |
| 150                | 290    | 3.45   | 190              | 180    | 12                |               |   |
| 190                | 350    | 2.86   | 230              | 200    | 13                |               |   |
| 250                | 440    | 2.27   | 300              | 270    | 18                |               |   |
| 300                | 500    | 2.00   | 380              | 350    | 20                |               |   |
| 350                | 560    | 1.79   | 400              | 350    | 22                |               |   |
| 25                 | 160    | 6.25   | 80               | 50     | 6                 |               |   |
| 50                 | 190    | 5.26   | 100              | 80     | 7                 |               |   |
| 75                 | 220    | 4.55   | 120              | 100    | 8                 |               |   |
| 125                | 300    | 3.33   | 140              | 140    | 10                |               |   |
| 190                | 375    | 2.67   | 250              | 250    | 12                |               |   |
| 250                | 450    | 2.22   | 310              | 300    | 18                |               |   |
| 300                | 540    | 1.85   | 390              | 360    | 22                |               |   |
| 350                | 620    | 1.61   | 410              | 380    | 24                |               |   |
| 75                 | 310    | 3.23   | 190              | 130    | 10                |               |   |
| 125                | 390    | 2.56   | 220              | 160    | 12                |               |   |
| 250                | 550    | 1.82   | 360              | 300    | 20                |               |   |

|   | Product name            | Generic name | Construction                   | Product structure | Total thickness | Treatment   |
|---|-------------------------|--------------|--------------------------------|-------------------|-----------------|---|
|   |                         |              |                                | <b>mils</b>       | <b>mm</b>       |   |
|    | DMD 100<br>Myoflex® PVS | DMD          | PET felt / PET film / PET felt | 2/1/2             | 0.13            | Fully saturated                                       |
|   |                         |              |                                | 2/2/2             | 0.15            |   |
|   |                         |              |                                | 2/3/2             | 0.18            |   |
|   |                         |              |                                | 2/4/2             | 0.20            |   |
|   |                         |              |                                | 2/5/2             | 0.25            |   |
|   |                         |              |                                | 2/7.5/2           | 0.30            |   |
|   |                         |              |                                | 2/10/2            | 0.35            |   |
|   |                         |              |                                | 2/12/2            | 0.42            |   |
|   |                         |              |                                | 2/14/2            | 0.45            |   |
|   |                         |              |                                | 3/2/3             | 0.22            |   |
|   |                         |              |                                | 3/3/3             | 0.25            |   |
|   |                         |              |                                | 3/5/3             | 0.30            |   |
|   |                         |              |                                | 3/7.5/3           | 0.35            |   |
|   |                         |              |                                | 3/10/3            | 0.41            |   |
|   |                         |              |                                | 5/3/5             | 0.34            |   |
| 5/5/5   | 0.37                    |              |                                |                   |                 |   |
| 5/10/5  | 0.5                     |              |                                |                   |                 |   |
|  | Myoflex PVSH            | DMD          | PET felt / PET film / PET felt | 3/1/3             | 0.18            | Fully saturated, with high thermal-resistant adhesive |
|   |                         |              |                                | 3/2/3             | 0.21            |   |
|   |                         |              |                                | 3/3/3             | 0.23            |   |
|   |                         |              |                                | 3/4/3             | 0.25            |   |
|   |                         |              |                                | 3/5/3             | 0.28            |   |
|   |                         |              |                                | 3/7.5/3           | 0.34            |   |
|   |                         |              |                                | 3/10/3            | 0.4             |   |
|   |                         |              |                                | 3/12/3            | 0.45            |   |
|   |                         |              |                                | 3/14/3            | 0.51            |   |

Measured values are in compliance with IEC standard 626-2 and thermal class ratings are according to IEC 216 and IEC 85.



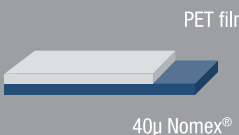


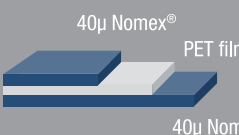


| PET film thickness | Weight | Yield  | Tensile strength |        | Breakdown voltage | Thermal class | Advantages / key applications  |       |   |
|--------------------|--------|--------|------------------|--------|-------------------|---------------|--|-------|---|
|                    |        |        | DM               | MD     |                   |               |  |       |   |
| µm                 | g/sqm  | sqm/kg | > N/cm           | > N/cm | > KV              | °C            |  |       |   |
| 23                 | 134    | 7.45   | 70               | 50     | 5.5               | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion |       |   |
| 50                 | 165    | 6.06   | 95               | 75     | 7                 |               |  |       |   |
| 75                 | 205    | 4.88   | 125              | 105    | 8                 |               |  |       |   |
| 100                | 240    | 4.17   | 150              | 125    | 9                 |               |  |       |   |
| 125                | 275    | 3.64   | 195              | 180    | 10                |               |  |       |   |
| 150                | 290    | 3.45   | 190              | 180    | 12                |               |  |       |   |
| 190                | 370    | 2.70   | 260              | 240    | 14                |               |  |       |   |
| 250                | 450    | 2.22   | 330              | 300    | 18                |               |  |       |   |
| 300                | 505    | 1.98   | 370              | 330    | 20                |               |  |       |   |
| 350                | 580    | 1.72   | 400              | 380    | 22                |               |  |       |   |
| 50                 | 210    | 4.76   | 120              | 80     | 8                 |               |  |       |   |
| 75                 | 235    | 4.26   | 150              | 100    | 9                 |               |  |       |   |
| 125                | 320    | 3.13   | 200              | 170    | 11                |               |  |       |   |
| 190                | 390    | 2.56   | 280              | 240    | 13                |               |  |       |   |
| 250                | 465    | 2.15   | 350              | 320    | 19                |               |  |       |   |
| 75                 | 335    | 2.99   | 220              | 160    | 11                |               |  |       |   |
| 125                | 405    | 2.47   | 250              | 180    | 12                |               |  |       |   |
| 250                | 580    | 1.72   | 400              | 320    | 20                |               |  |       |   |
| 23                 | 176.7  | 5.66   | 90               | 50     | 5.5               |               |  | 180°C | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>Operating temperature 180°C |
| 50                 | 214.5  | 4.66   | 175              | 155    | 6.5               |               |  |       |   |
| 75                 | 249.5  | 4.01   | 190              | 170    | 9.5               |               |  |       |   |
| 100                | 284    | 3.521  | 220              | 185    | 11                |               |  |       |   |
| 125                | 325    | 3.08   | 250              | 200    | 12                |               |  |       |   |
| 190                | 414    | 2.42   | 300              | 225    | 15.5              |               |  |       |   |
| 250                | 500    | 2      | 350              | 280    | 18                |               |  |       |   |
| 350                | 640    | 1.56   | 410              | 380    | 22                |               |  |       |   |



# Myoflex® Flexible Laminates

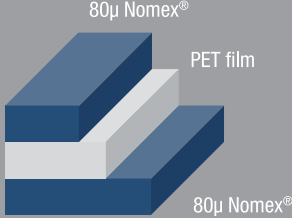
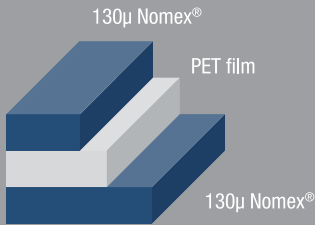
with Nomex®<sup>®1)</sup> paper and polyester film

|   | Product name | Generic name | Construction                                     | Product structure | Total thickness | Treatment  |
|---|--------------|--------------|--|-------------------|-----------------|------------|
|   |              |              |  | <b>mils</b>       | <b>mm</b>       |            |
|  <p>PET film</p> <p>40µm Nomex®</p>                      | Myoflex 1N40 | NM           | 40µm Nomex® paper / PET film                     | 1.5/2             | 0.1             | Calendered |
|   |              |              |  | 1.5/3             | 0.13            |            |
|   |              |              |  | 1.5/4             | 0.15            |            |
|   |              |              |  | 1.5/5             | 0.18            |            |
|   |              |              |  | 1.5/6             | 0.2             |            |
|   |              |              |  | 1.5/7.5           | 0.24            |            |
|   |              |              |  | 1.5/10            | 0.3             |            |
|  <p>PET film</p> <p>50µm Nomex®</p>                     | Myoflex 1N50 | NM           | 50µm Nomex® paper / PET film                     | 2/1               | 0.08            | Calendered |
|   |              |              |  | 2/2               | 0.11            |            |
|   |              |              |  | 2/3               | 0.13            |            |
|   |              |              |  | 2/4               | 0.16            |            |
|   |              |              |  | 2/5               | 0.18            |            |
|   |              |              |  | 2/7.5             | 0.25            |            |
|   |              |              |  | 2/10              | 0.31            |            |
|   |              |              |  | 2/12              | 0.35            |            |
| 2/14  | 0.41         |              |  |                   |                 |            |
|  <p>PET film</p> <p>80µm Nomex®</p>                    | Myoflex 1N80 | NM           | 80µm Nomex® paper / PET film                     | 3/1               | 0.11            | Calendered |
|   |              |              |  | 3/2               | 0.14            |            |
|   |              |              |  | 3/3               | 0.16            |            |
|   |              |              |  | 3/4               | 0.19            |            |
|   |              |              |  | 3/5               | 0.21            |            |
|   |              |              |  | 3/7.5             | 0.28            |            |
|   |              |              |  | 3/10              | 0.34            |            |
|   |              |              |  | 3/12              | 0.39            |            |
| 3/14  | 0.44         |              |  |                   |                 |            |
|  <p>40µm Nomex®</p> <p>PET film</p> <p>40µm Nomex®</p> | Myoflex 2N40 | NMN          | 40µm Nomex® paper / PET film / 40µm Nomex® paper | 1.5/2/1.5         | 0.13            | Calendered |
|   |              |              |  | 1.5/3/1.5         | 0.16            |            |
|   |              |              |  | 1.5/4/1.5         | 0.18            |            |
|   |              |              |  | 1.5/5/1.5         | 0.21            |            |
|   |              |              |  | 1.5/6/1.5         | 0.23            |            |
|   |              |              |  | 1.5/7.5/1.5       | 0.28            |            |
|   |              |              |  | 1.5/10/1.5        | 0.34            |            |





| PET film thickness | Weight | Yield  | Tensile strength |        | Breakdown voltage | Thermal class | Advantages / key applications  |
|--------------------|--------|--------|------------------|--------|-------------------|---------------|--|
|                    |        |        | DM               | MD     |                   |               |  |
| µm                 | g/sqm  | sqm/kg | > N/cm           | > N/cm | > KV              | °C            |  |
| 50                 | 110    | 9.09   | 70               | 60     | 6                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance  |
| 75                 | 150    | 6.67   | 100              | 90     | 8                 |               |  |
| 100                | 190    | 5.26   | 130              | 110    | 10                |               |  |
| 125                | 220    | 4.55   | 150              | 130    | 11                |               |  |
| 150                | 250    | 4      | 170              | 150    | 12                |               |  |
| 190                | 300    | 3.33   | 220              | 200    | 15                |               |  |
| 250                | 390    | 2.56   | 250              | 230    | 17                |               |  |
| 23                 | 85     | 11.7   | 60               | 50     | 5                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance  |
| 50                 | 123    | 8.13   | 90               | 80     | 8                 |               |  |
| 75                 | 158    | 6.33   | 120              | 100    | 11                |               |  |
| 100                | 193    | 5.18   | 150              | 120    | 14                |               |  |
| 125                | 228    | 4.39   | 180              | 145    | 16                |               |  |
| 190                | 319    | 3.13   | 240              | 200    | 18                |               |  |
| 250                | 403    | 2.48   | 300              | 245    | 20                |               |  |
| 300                | 473    | 2.11   | 320              | 275    | 24                |               |  |
| 350                | 543    | 1.84   | 340              | 290    | 29                |               |  |
| 23                 | 110    | 9.11   | 80               | 50     | 6                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance<br>Strong mechanical resistance              |
| 50                 | 148    | 6.78   | 110              | 80     | 9                 |               |  |
| 75                 | 183    | 5.48   | 130              | 100    | 12                |               |  |
| 100                | 218    | 4.60   | 165              | 120    | 15                |               |  |
| 125                | 253    | 3.95   | 200              | 145    | 16                |               |  |
| 190                | 344    | 2.91   | 240              | 200    | 18                |               |  |
| 250                | 428    | 2.34   | 300              | 245    | 20                |               |  |
| 300                | 500    | 2.00   | 340              | 270    | 24                |               |  |
| 350                | 570    | 1.75   | 380              | 300    | 28                |               |  |
| 50                 | 150    | 6.67   | 100              | 80     | 9                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance<br>Also suited for motors operating at 180°C |
| 75                 | 200    | 5.00   | 130              | 120    | 10                |               |  |
| 100                | 240    | 4.17   | 160              | 150    | 12                |               |  |
| 125                | 260    | 3.85   | 180              | 170    | 13                |               |  |
| 150                | 290    | 3.45   | 200              | 190    | 14                |               |  |
| 190                | 350    | 2.86   | 250              | 240    | 18                |               |  |
| 250                | 435    | 2.30   | 280              | 270    | 19                |               |  |

|   | Product name    | Generic name | Construction                                       | Product structure | Total thickness | Treatment      |
|---|-----------------|--------------|--|-------------------|-----------------|----------------|
|   |                 |              |  | <b>mils</b>       | <b>mm</b>       |                |
|   | Myoflex 2N50    | NMN          | 50µm Nomex® paper / PET film / 50µm Nomex® paper   | 2/1/2             | 0.15            | Calendered     |
|   |                 |              |  | 2/2/2             | 0.17            |                |
|   |                 |              |  | 2/3/2             | 0.19            |                |
|   |                 |              |  | 2/4/2             | 0.22            |                |
|   |                 |              |  | 2/5/2             | 0.24            |                |
|   |                 |              |  | 2/6/2             | 0.26            |                |
|   |                 |              |  | 2/7.5/2           | 0.31            |                |
|   |                 |              |  | 2/10/2            | 0.37            |                |
|   |                 |              |  | 2/12/2            | 0.42            |                |
|   |                 |              |  | 2/14/2            | 0.47            |                |
|   | Myoflex 2N80    | NMN          | 80µm Nomex® paper / PET film / 80µm Nomex® paper   | 3/1/3             | 0.19            | Calendered     |
|   |                 |              |  | 3/2/3             | 0.22            |                |
|   |                 |              |  | 3/3/3             | 0.25            |                |
|   |                 |              |  | 3/4/3             | 0.28            |                |
|   |                 |              |  | 3/5/3             | 0.31            |                |
|   |                 |              |  | 3/7.5/3           | 0.36            |                |
|   |                 |              |  | 3/10/3            | 0.43            |                |
|   |                 |              |  | 3/12/3            | 0.48            |                |
|   |                 |              |  | 3/14/3            | 0.53            |                |
|  | Myoflex 2N130   | NMN          | 130µm Nomex® paper / PET film / 130µm Nomex® paper | 5/1/5             | 0.30            | Calendered     |
|   |                 |              |  | 5/2/5             | 0.33            |                |
|   |                 |              |  | 5/3/5             | 0.35            |                |
|   |                 |              |  | 5/4/5             | 0.37            |                |
|   |                 |              |  | 5/5/5             | 0.4             |                |
|   | Myoflex 2N130NC | NMN          | 130µm Nomex® paper / PET film / 130µm Nomex® paper | 5/1/5             | 0.30            | Non-calendered |
|   |                 |              |  | 5/2/5             | 0.33            |                |
|   |                 |              |  | 5/3/5             | 0.35            |                |
|   |                 |              |  | 5/4/5             | 0.39            |                |
|   |                 |              |  | 5/5/5             | 0.4             |                |

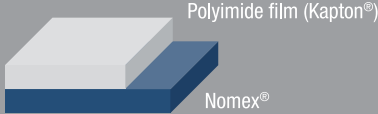
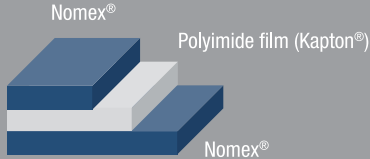
Measured values are in compliance with IEC standard 626-2 and thermal class ratings are according to IEC 216 and IEC 85. Nomex® is a registered trademark of Dupont™ and its affiliates.



| PET film thickness | Weight    | Yield  | Tensile strength |        | Breakdown voltage | Thermal class | Advantages / key applications  |
|--------------------|-----------|--------|------------------|--------|-------------------|---------------|--|
|                    |           |        | DM               | MD     |                   |               |  |
| µm                 | g/sqm     | sqm/kg | > N/cm           | > N/cm | > KV              | °C            |  |
| 23                 | 138       | 7.24   | 100              | 80     | 6                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance<br>Also suited for motors operating at 180°C                                 |
| 50                 | 182       | 5.68   | 140              | 110    | 9                 |               |  |
| 75                 | 217       | 4.74   | 160              | 140    | 10                |               |  |
| 100                | 252       | 4.07   | 180              | 150    | 14                |               |  |
| 125                | 287       | 3.56   | 220              | 200    | 16                |               |  |
| 150                | 322       | 3.11   | 240              | 230    | 17                |               |  |
| 190                | 378       | 2.69   | 280              | 260    | 18                |               |  |
| 250                | 462       | 2.19   | 330              | 300    | 20                |               |  |
| 300                | 532 (526) | 1.9    | 370              | 350    | 23                |               |  |
| 350                | 602       | 1.68   | 400              | 380    | 28                |               |  |
| 23                 | 187       | 5.34   | 180              | 110    | 6                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance<br>Also suited for motors operating at 180°C<br>Strong mechanical resistance |
| 50                 | 225       | 4.44   | 200              | 150    | 10                |               |  |
| 75                 | 260       | 3.84   | 240              | 180    | 12                |               |  |
| 100                | 295       | 3.39   | 280              | 190    | 14                |               |  |
| 125                | 330       | 3.03   | 280              | 220    | 16                |               |  |
| 190                | 421       | 2.37   | 360              | 300    | 18                |               |  |
| 250                | 505       | 1.98   | 420              | 380    | 21                |               |  |
| 300                | 575       | 1.74   | 470              | 400    | 24                |               |  |
| 350                | 645       | 1.55   | 550              | 480    | 30                |               |  |
| 25                 | 314       | 3.18   | 80               | 55     | 7                 | 155°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation<br><b>Transformer:</b> intermediate and top layers<br>Designed for automatic insertion<br>High thermal resistance  |
| 50                 | 349       | 2.86   | 110              | 90     | 10                |               |  |
| 75                 | 384       | 2.60   | 130              | 110    | 13                |               |  |
| 100                | 419       | 2.38   | 170              | 130    | 16                |               |  |
| 125                | 425       | 2.35   | 220              | 210    | 18                |               |  |
| 25                 | 136       | 7.34   | 60               | nd     | 5                 | 155°C         | <b>NC:</b> non-calendered Nomex®<br>Phase insulation application<br>Good absorption of varnishes and resins<br>High thermal resistance   |
| 50                 | 200       | 5.00   | 90               | nd     | 7                 |               |  |
| 75                 | 235       | 4.25   | 120              | nd     | 10                |               |  |
| 100                | 280       | 3.57   | 160              | nd     | 13                |               |  |
| 125                | 300       | 3.33   | 220              | nd     | 16                |               |  |

# Myoflex® Flexible Laminates

with Nomex®<sup>®1)</sup> paper and polyimide film

|   | Product name  | Generic name  | Construction   | Product structure | Total thickness | Treatment  |
|---|---|---------------|--|-------------------|-----------------|------------|
|   |   |               |  | mils              | mm              |            |
|  | Myoflex 1NK25   | NK            | Nomex® paper / Polyimide film (Kapton®)                | 2/1               | 0.09            | Calendered |
|   |   |               |  | 3/1               | 0.12            |            |
|   |   |               |  | 5/1               | 0.17            |            |
|   |   |               |  | 7/1               | 0.22            |            |
|   |   |               |  | 10/1              | 0.29            |            |
|   | Myoflex 1NK50   | NK            | Nomex® paper / Polyimide film (Kapton®)                | 2/2               | 0.11            | Calendered |
|   |   |               |  | 3/2               | 0.14            |            |
|   |   |               |  | 5/2               | 0.2             |            |
|   |   |               |  | 7/2               | 0.25            |            |
|   | Myoflex 1NK75   | NK            | Nomex® paper / Polyimide film (Kapton®)                | 2/3               | 0.14            | Calendered |
|   |   |               |  | 3/3               | 0.17            |            |
|   |   |               |  | 5/3               | 0.22            |            |
|   |   |               |  | 7/3               | 0.27            |            |
|   | Myoflex NH  | NH            | Nomex® paper / Polyimide film                          | 7/1               | 0.22            | Calendered |
|   |   |               |  | 2/1               | 0.09            |            |
|   |  | Myoflex 2NK25 | NKN  |                   | 3/1/3           | 0.21       |
| 5/1/5   |   |               |  |                   | 0.31            |            |
| 7/1/7   |   |               |  |                   | 0.41            |            |
| Myoflex 2NK50   |   | NKN           | Nomex® paper / Polyimide film (Kapton®) / Nomex® paper | 3/2/3             | 0.24            | Calendered |
|   |   |               |  | 5/2/5             | 0.34            |            |
|   |   |               |  | 7/2/7             | 0.43            |            |
| Myoflex 2NK75   |   | NKN           |  | 3/3/3             | 0.25            | Calendered |
|   |   |               |  | 5/3/5             | 0.34            |            |
|   |   |               |  | 7/3/7             | 0.45            |            |
| Myoflex NHN   |   | NHN           | Nomex® paper / Polyimide film / Nomex® paper           | 2/1/2             | 0.15            | Calendered |
|   |   |               |  | 3/1/3             | 0.20            |            |
|   |   |               |  | 3/2/3             | 0.22            |            |
|   |   |               |  | 5/1/5             | 0.30            |            |
|   | 2/3/2   |               |  | 0.19              |                 |            |
|   | 3/3/3   |               |  | 0.25              |                 |            |
|   | 2/5/2   |               |  | 0.25              |                 |            |
|   | 2/7/2   |               |  | 0.30              |                 |            |
|   | 2/7/3   |               |  | 0.32              |                 |            |
|   | 5/2/5   |               |  | 0.35              |                 |            |
| 3/7/3   | 0.35  |               |  |                   |                 |            |
| 5/3/3   | 0.30  |               |  |                   |                 |            |
| 5/3/5   | 0.35  |               |  |                   |                 |            |

Measured values are in compliance with IEC standard 626-2 and thermal class ratings are according to IEC 216 and IEC 85. Nomex® and Kapton® are registered trademarks of DuPont™ and its affiliates.

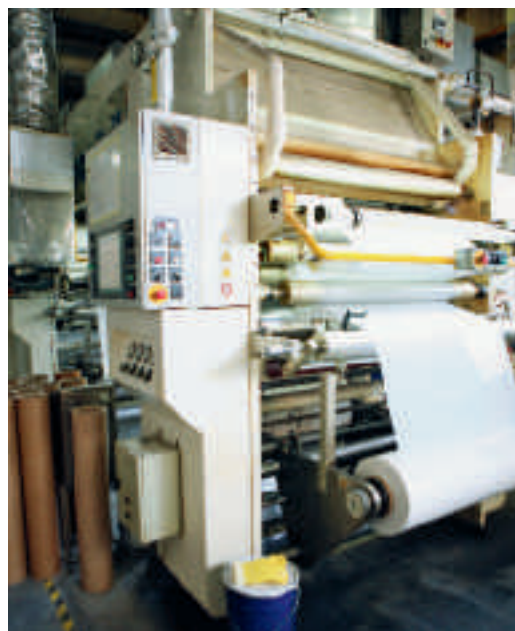


| Polyimide film thickness | Weight | Yield  | Tensile strength |        | Breakdown voltage | Thermal class | Advantages / key applications   |
|--------------------------|--------|--------|------------------|--------|-------------------|---------------|---|
|                          |        |        | DM               | MD     |                   |               |   |
| µm                       | g/sqm  | sqm/kg | > N/cm           | > N/cm | > KV              | °C            |   |
| 50                       | 92     | 10.93  | 100              | 60     | 8                 | 220°C         |   |
| 80                       | 118    | 8.99   | 110              | 70     | 7                 |               |   |
| 130                      | 167    | 5.98   | 120              | 75     | 10                |               |   |
| 180                      | 220    | 4.30   | 130              | 80     | 9.5               |               |   |
| 250                      | 288    | 3.44   | 140              | 85     | 10                |               |   |
| 50                       | 125    | 8.00   | 130              | 95     | 8                 | 220°C         |   |
| 80                       | 151    | 6.62   | 140              | 110    | 11.5              |               |   |
| 130                      | 196.1  | 5.1    | 145              | 115    | 12                |               |   |
| 180                      | 260    | 3.85   | 155              | 125    | 12.7              |               |   |
| 250                      | 320    | 3.47   | 170              | 140    | 10                |               |   |
| 50                       | 163    | 6.15   | 170              | 180    | 14                | 220°C         |   |
| 80                       | 188    | 5.34   | 175              | 185    | 15                |               |   |
| 130                      | 232    | 4.32   | 180              | 190    | 17                |               |   |
| 180                      | 304    | 3.30   | 185              | 195    | 19                |               |   |
| 250                      | 362    | 2.77   | 190              | 200    | 22                |               |   |
| 180                      | 225    | 4.44   | 330              | 140    | 8.5               | 220°C         | <b>Motor:</b> ground and slot insulation, slot closure and phase insulation                               |
| 50                       | 90     | 11.1   | 60               | 40     | 7                 |               |   |
| 80                       | 195.6  | 5.11   | 116              | 76     | 8                 | 220°C         | <b>Transformer:</b> intermediate and top layers<br>Suited for traction motors and generators              |
| 130                      | 290    | 3.45   | 100              | 59.7   | 11                |               |   |
| 180                      | 196.5  | 5.09   | 26               | 20     | 13                |               |   |
| 80                       | 231    | 4.33   | 115              | 120    | 11                | 220°C         | Designed for automatic insertion<br>Outstanding electrical insulation at elevated temperature up to 220°C |
| 130                      | 181    | 5.52   | 120              | 125    | 13                |               |   |
| 180                      |        |        | 125              | 130    | 15                |               |   |
| 80                       | 266    | 3.76   | 175              | 180    | 18                | 220°C         |   |
| 130                      | 337    | 2.96   | 180              | 185    | 22                |               |   |
| 180                      | 500    | 2      | 185              | 190    | 25                |               |   |
| 50                       | 150    | 6.67   | 80               | 60     | 8                 | 220°C         |   |
| 80                       | 200    | 5      | 160              | 100    | 8                 |               |   |
| 80                       | 240    | 4.17   | 190              | 120    | 11                |               |   |
| 130                      | 310    | 3.23   | 280              | 180    | 10                |               |   |
| 50                       | 220    | 4.55   | 150              | 100    | 14                |               |   |
| 80                       | 275    | 3.64   | 220              | 140    | 15                |               |   |
| 50                       | 300    | 3.33   | 200              | 140    | 18                |               |   |
| 50                       | 355    | 2.82   | 220              | 180    | 19                |               |   |
| 50/80                    | 380    | 2.63   | 250              | 200    | 22                |               |   |
| 130                      | 350    | 2.86   | 310              | 200    | 12                |               |   |
| 80                       | 410    | 2.44   | 280              | 230    | 22                |               |   |
| 130/80                   | 320    | 3.13   | 240              | 160    | 15                |               |   |
| 130                      | 375    | 2.67   | 330              | 160    | 15                |               |   |

## Forms of Delivery

| Product denomination | Width untrimmed mm | ID core mm | Maximum roll diameter mm | Weight delivery kg |     | Jumbo delivery kg | Minimum standard width slit rolls* mm |
|----------------------|--------------------|------------|--------------------------|--------------------|-----|-------------------|---------------------------------------|
| Myoflex PV/1         | 1000               | 76         | 480                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex PVS/1        | 1000               | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex PV           | 1000               | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex PVS          | 1000               | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex PVSH         | 1000               | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 1N50         | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 1N80         | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2N50         | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2N80         | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2N130        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2N130NC      | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 1NK25        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 1NK50        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 1NK75        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2NK25        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2NK50        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex 2NK75        | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |
| Myoflex NHN          | 925                | 76         | 400                      | 50                 | 100 | 120-180           | 6                                     |

\* Smaller widths possible by special request



## Certifications and UL Approvals

| Product denomination | VRI-Spa-130°C | VRI-Spa-155°C | VRI-Spa-180°C | VR-130-1P | VR-155-1P | VR-180-1P |
|----------------------|---------------|---------------|---------------|-----------|-----------|-----------|
| Myoflex PV/1         |               |               |               | Y         |           |           |
| Myoflex PVS/1        |               |               |               | Y         |           |           |
| Myoflex PV           |               |               |               | Y         |           |           |
| Myoflex PVS          |               | Y             |               | Y         |           |           |
| Myoflex PVSH         |               |               |               | Y         |           |           |
| Myoflex 1N50         | Y             |               |               | Y         | Y         | Y         |
| Myoflex 1N80         | Y             |               |               | Y         | Y         | Y         |
| Myoflex 2N50         | Y             |               | Y             | Y         | Y         | Y         |
| Myoflex 2N80         | Y             |               | Y             | Y         | Y         | Y         |
| Myoflex 2N130        | Y             |               | Y             | Y         | Y         | Y         |
| Myoflex 2N130NC      | Y             |               |               | Y         |           | Y         |
| Myoflex 1NK25        | Y             |               |               | Y         | Y         | Y         |
| Myoflex 1NK50        | Y             |               |               | Y         | Y         | Y         |
| Myoflex 1NK75        | Y             |               |               | Y         | Y         | Y         |
| Myoflex 2NK25        | Y             |               |               | Y         | Y         | Y         |
| Myoflex 2NK50        | Y             |               |               | Y         | Y         | Y         |
| Myoflex 2NK75        | Y             |               |               | Y         | Y         | Y         |
| Myoflex NHH          |               |               |               | Y         | Y         | Y         |
| Myoflex NH           |               |               |               |           | Y         | Y         |



# We Enable Energy

Von Roll is the sole full-range supplier of materials and systems for the insulation of electrical machines as well as high-performance products for various high-tech industries.



## Mica

All materials related to high-voltage insulation. Von Roll's commitment to mica starts with mining and ends with finished tapes.



## Wires

Insulated round, flat and Litz wires for high-voltage, low-voltage and electronic applications.



## Cables

Mica tapes for fire-resistant cables. Von Roll provides a wide range of products that are ideally suited to all commonly used standards.



## Liquids

Impregnation resins for high- and low-voltage, potting resins, casting resins, as well as encapsulating and conformal coatings.



## Composites

Engineered materials made from a resin and a support structure with distinct physical, thermal and electrical properties. They can be molded, machined or semi-finished.



## Flexibles

Insulating flexible materials for low-voltage applications such as flexible laminates and adhesive tapes.



## Ballistic Protection

High-quality systems for armored defense based on thermoset / thermoplastic products in single-use or tailored combinations.



## Transformers

High-performance transformers for power transmission and distribution, solutions tailored to all applications of today's energy-supply companies.



## Water

Von Roll Water provides solutions for process engineering tasks in the field of water and waste water management.



## Testing

Von Roll provides electrical, thermal and mechanical testing of individual materials as well as complete insulating systems.



## Training

Von Roll Corporate University provides a training program in high- and low-voltage insulation for its customers.

Please contact us or visit our website [www.vonroll.com](http://www.vonroll.com) for further information:

### Customer Service

Europe

**Von Roll Schweiz AG**

Passwangstrasse 20

4426 Breitenbach

Switzerland

P +41 61 785 5111

F +41 61 785 5188

Asia/Pacific

**Von Roll Shanghai Co. Ltd.**

Unit C, No.1235, Minqiang Road

Songjiang District

Shanghai 201612

P +65 6556 4788

F +65 6556 4959

**Von Roll Asia Pte Ltd.**

6 Serangoon North Avenue 5

#03-01

Singapore 554910

Singapore

P +65 6556 4788

F +65 6556 4959

Americas

**Von Roll USA, Inc.**

200 Von Roll Drive

Schenectady

NY 12306

USA

P +1 518-344-7100

F +1 518-344-7288

### About Von Roll

We Enable Energy – As one of Switzerland's longest established industrial companies, Von Roll focuses on products and systems for power generation, transmission and distribution. Von Roll's business portfolio is divided into three business lines: **Von Roll Insulation** offers electrical insulation products, systems and services for generators, high- and low-voltage motors, transformers and other applications. **Von Roll Composites** produces composite materials and parts for assorted industry appliances. The business line **Von Roll Technologies** includes the new sustainable technologies: **Von Roll Transformers** and **Von Roll Water**. **Von Roll Transformers** offers complete solutions for the fast-expanding market of high-performance transformers. **Von Roll Water** provides solutions for process engineering tasks in the field of water and wastewater management.