

| PROPERTY* | UNITS | ASTM or UL TEST | TIVAR® H.O.T | TIVAR® CLEANSTAT | TIVAR® EXP | TIVAR® 1000 POLYSTEEL | TIVAR® UV RESISTANT | TIVAR® DS |
|-----------|-------|-----------------|--------------|------------------|------------|-----------------------|---------------------|-----------|
|-----------|-------|-----------------|--------------|------------------|------------|-----------------------|---------------------|-----------|

| PHYSICAL            |                        |             |          |          |          |          |          |          |
|---------------------|------------------------|-------------|----------|----------|----------|----------|----------|----------|
| DENSITY             | gm/cc                  | ASTM D-792  | 0.94     | 0.94     | 0.95     | 1.45     | 0.93     | 0.93     |
| TENSILE PROPERTIES  |                        | ASTM D-638  |          |          |          |          |          |          |
| YIELD STRENGTH      | psi                    |             | 3500     | 3075     | 2700     | 2334     | 3000     | 3205     |
| TENSILE AT BREAK    | psi                    |             | 5800     | 5163     | 5280     | 2755     | 4000     | 5990     |
| ELONGATION AT BREAK | percent                |             | 300      | 200      | 300      | 125      | 140      | 400      |
| TENSILE MODULUS     | psi                    | ASTM D-638  | 100,000  | 118,900  | 101,900  | N/A      | 156,900  | 154,900  |
| FLEXURAL MODULUS    |                        | ASTM D-790B | 110,000  |          |          |          |          |          |
| 1% SCANT            | psi                    |             |          | 110,230  | 85,000   | 108,750  | 100,000  | 92,390   |
| IMPACT STRENGTH     |                        |             |          |          |          |          |          |          |
| IZOD IMPACT         |                        | ASTM D-256A | NO BREAK | NO BREAK | NO BREAK | NO BREAK | NO BREAK | NO BREAK |
| TENSILE IMPACT      | ft-lbs/in <sup>2</sup> | ASTM D-1822 |          | 702      | 343      | 250      | 400      | 1200     |

| WEAR                                    |                |          |      |      |      |      |           |      |
|---|----------------|----------|------|------|------|------|-----------|------|
| SAND ON WHEEL                           | mg weight loss |          |      | 130  | 91   | 240  | 100       | 90   |
| ABRASION INDEX                          | 1018 steel=100 |          | 10   | N/A  | 9    | N/A  | 10        | 9    |
| COEFFICIENT OF FRICTION (DRY vs. STEEL) |                | QTM55007 |      |      |      |      |           |      |
| STATIC                                  |                |          |      | 0.15 | 0.2  | 0.2  | .15 - .20 | 0.18 |
| KINETIC                                 |                |          | 0.12 | 0.12 | 0.17 | 0.14 | .10 - .14 | 0.12 |
| HARDNESS                                | shore D        |          | 68   | 68   | 70   | 64   | 68        | 68   |

| ELECTRICAL/FDA      |         |            |       |            |      |      |           |      |
|---------------------|---------|------------|-------|------------|------|------|-----------|------|
| STATIC DECAY TIME   | seconds | FTS-101C   |       |            |      |      | <0.1      |      |
| DIELECTRIC CONSTANT |         | ASTM D-150 | 2.3   |            |      |      |           |      |
| DISSIPATION FACTOR  |         | ASTM D-150 | .0005 |            |      |      |           |      |
| SURFACE RESISTIVITY | ohms    | ASTM D-257 | 1013  | 107 - 1010 | 1017 | 1017 | 105 - 109 | 1015 |
| VOLUME RESISTIVITY  | ohms-cm | ASTM D-257 | 1013  | 107 - 1010 | 1017 | 1017 | 105 - 109 | 1015 |
| FDA STANDARDS       |         |            | YES   | YES        | NO   | NO   | NO        | NO   |

| TEMPERATURE           |          |             |     |            |            |            |            |            |
|-----------------------|----------|-------------|-----|------------|------------|------------|------------|------------|
| TEMPERATURE RANGE     |          | ASTM D-648  |     |            |            |            |            |            |
| MAXIMUM**             |          |             |     |            |            |            |            |            |
| CONSTANT              | °F       |             | 275 | 180        | 180        | 180        | 180        | 180        |
| INTERMITTENT          | °F       |             |     | 200        | 250        | 200        | 200        | 200        |
| MINIMUM               |          |             | N/A | N/A        | N/A        | N/A        | N/A        | N/A        |
| COF THERMAL EXPANSION |          | ASTM D-2240 |     |            |            |            |            |            |
| -30° to + 60°         | in/in/°c |             |     | 2 x 10-4   | 1.6 x 10-4 | 1.8 x 10-4 | 2 x 10-4   | 2 x 10-4   |
| -54° to + 140°        | in/in/°f |             |     | 1.1 x 10-4 | 0.9 x 10-4 | 1 x 10-4   | 1.1 x 10-4 | 1.1 x 10-4 |

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| PROPERTY* | UNITS | ASTM OR UL TEST | TIVAR® 88 &88-2 | TIVAR® 1000 | TIVAR® 1000 ANTISTATIC | TIVAR® DRYSLIDE | CERAMP® | TIVAR® OIL FILLED |
|-----------|-------|-----------------|-----------------|-------------|------------------------|-----------------|---------|-------------------|
|-----------|-------|-----------------|-----------------|-------------|------------------------|-----------------|---------|-------------------|

| PHYSICAL            |                        |             |          |          |          |          |          |          |
|---------------------|------------------------|-------------|----------|----------|----------|----------|----------|----------|
| DENSITY             | gm/cc                  | ASTM D-792  | 0.93     | 0.93     | 0.93     | 0.93     | 0.964    | 0.928    |
| TENSILE PROPERTIES  |                        | ASTM D-638  |          |          |          |          |          |          |
| YIELD STRENGTH      | psi                    |             | 3000     | 3050     | 3000     | 2770     | 2800     | 2600     |
| TENSILE AT BREAK    | psi                    |             | 5600     | 5800     | 4000     | 4815     | 3800     | 6527     |
| ELONGATION AT BREAK | percent                |             | 300      | 200      | 140      | 200      | 300      | 280      |
| TENSILE MODULUS     | psi                    | ASTM D-638  | 102,000  | 120,000  | 156,900  | 118,643  | 130,970  | 76,000   |
| FLEXURAL MODULUS    |                        | ASTM D-790B |          |          |          |          |          |          |
| 1% SCANT            | psi                    |             | 102,000  | 110,000  | 100,000  | 106,459  | 99,933   | 63,818   |
| IMPACT STRENGTH     |                        |             |          |          |          |          |          |          |
| IZOD IMPACT         |                        | ASTM D-256A | NO BREAK | NO BREAK | NO BREAK | NO BREAK | NO BREAK | NO BREAK |
| TENSILE IMPACT      | ft-lbs/in <sup>2</sup> | ASTM D-1822 | N/A      | 715      | 400      | 653      | 750      | 1366     |

| WEAR                                    |                |             |     |           |           |      |      |           |
|---|----------------|-------------|-----|-----------|-----------|------|------|-----------|
| SAND ON WHEEL                           | mg weight loss | ASTM G-64   |     | 100       | 100       | 100  | 85   | 100       |
| ABRASION INDEX                          | 1018 steel=100 | SAND SLURRY |     | 10        | 10        | 10   | 8    | 12        |
| COEFFICIENT OF FRICTION (DRY vs. STEEL) |                |             |     |           |           |      |      |           |
| STATIC                                  |                |             | .12 | .15 - .20 | .15 - .20 | 0.15 | 0.18 | .20 - .25 |
| KINETIC                                 |                |             |     | .10 - .14 | .10 - .14 | 0.08 | 0.12 | .10 - .15 |
| HARDNESS                                | shore D        | ASTM D-2240 | 69  | 68        | 68        | 68   | 70   | 68        |

| ELECTRICAL/FDA      |         |            |                        |                        |           |           |      |      |
|---------------------|---------|------------|------------------------|------------------------|-----------|-----------|------|------|
| STATIC DECAY TIME   | seconds | FTS-101C   |                        |                        | <0.1      |           |      |      |
| DIELECTRIC CONSTANT |         | ASTM D-150 | 2.3                    | 2.30 - 2.35            |           |           |      |      |
| DISSIPATION FACTOR  |         | ASTM D-150 | <.5 x 10 <sup>-3</sup> | <.5 x 10 <sup>-3</sup> |           |           |      |      |
| SURFACE RESISTIVITY | ohms    | ASTM D-257 | 1017                   | 1017                   | 105 - 109 | 105 - 109 | 1017 | 1017 |
| VOLUME RESISTIVITY  | ohms-cm | ASTM D-257 | 1017                   | 1017                   | 105 - 109 | 105 - 109 | 1017 | 1017 |
| FDA STANDARDS       |         |            | NO                     | YES                    | NO        | NO        | NO   | YES  |

| TEMPERATURE           |          |             |                        |                        |                        |                        |                        |                        |
|-----------------------|----------|-------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| TEMPERATURE RANGE     |          | ASTM D-648  |                        |                        |                        |                        |                        |                        |
| MAXIMUM**             |          |             |                        |                        |                        |                        |                        |                        |
| CONSTANT              | °F       |             | 180                    | 180                    | 180                    | 180                    | 220                    | 180                    |
| INTERMITTENT          | °F       |             | 200                    | 200                    | 200                    | 200                    | 240                    | 200                    |
| MINIMUM               |          |             | N/A                    | N/A                    | N/A                    | N/A                    | N/A                    | N/A                    |
| COF THERMAL EXPANSION |          | ASTM D-2240 |                        |                        |                        |                        |                        |                        |
| -30° to + 60°         | in/in/°c |             | 2 x 10 <sup>-4</sup>   | 2 x 10 <sup>-4</sup>   | 2 x 10 <sup>-4</sup>   | 2 x 10 <sup>-4</sup>   | 1.6 x 10 <sup>-4</sup> | 2 x 10 <sup>-4</sup>   |
| -54° to + 140°        | in/in/°f |             | 1.1 x 10 <sup>-4</sup> | 1.1 x 10 <sup>-4</sup> | 1.1 x 10 <sup>-4</sup> | 1.1 x 10 <sup>-4</sup> | 0.9 x 10 <sup>-4</sup> | 1.1 x 10 <sup>-4</sup> |

\*Values are averages and not specifications

\*\*Maximum operating temperatures may reach 250°F(121°C) under no load conditions for steam cleaning purposes

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