Harmonized cables are utilized on electronic and electrical equipment that is intended for use in Europe.

For years, European trade was very cumbersome since most countries required compliance to their own electrical standards. In order to facilitate export trade to the European communities, and develop a common European marketplace, an international safety standards agency called the European Committee for Electrotechnical Standardization (CENELEC) was formed to develop electrical standards that would be universally acceptable to all CENELEC member nations which are noted in the table below.

The electrical standards are classified as Harmonization Documents. “HAR” cordage and hook-up wire conforms to Harmonization Documents HD-21 and HD-22:

HD-21 Specification for Polyvinyl chloride insulated wire and cables.
HD-22 Specification for rubber insulated flexible cords and cables.

Compliance with these standards demands the use of Harmonized products on equipment operating in all CENELEC member countries. Additionally, Underwriters Laboratories (UL) approved the use of HAR cables on equipment for use outside the United States.

In order to identify a harmonized wire or cable, one of the following identification methods are employed: (1) Printed letters (HAR) on either the overall jacket or conductor insulation, or (2) Printed tape or identification threads.

Recommended applications as defined in the Harmonization Documents are as follows:

- Polyvinyl Chloride Cord (H05VV-F) - for use in offices, domestic premises, kitchens, household appliances, washing machines, spin dryers, refrigerators. Permitted for cooking and heating appliances, providing cable not in contact with hot parts and is not subject to radiation (UNSUITABLE FOR OUTDOOR USE).
- Rubber Cord (H07RN-F) - for use when cable subjected to mechanical stresses in dry and damp areas. Use as power for transportable motors, appliances, domestic electric tools and electrical tools such as circular saws, agricultural use, and utility water equipment. Can be installed on plaster and direct installation on structural parts of hoist and other heavy machines.

### HARMONIZED WIRE CODING SYSTEM

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H Harmonized Type</td>
<td>03 300/300 Volt</td>
<td>V PVC</td>
<td>V PVC</td>
<td>H Ribbon Cable, Separable</td>
<td>U Single Wire</td>
<td>X Without Protective Conductor</td>
<td>12 345 6 789</td>
<td></td>
</tr>
<tr>
<td>A National Type</td>
<td>05 300/500 Volt</td>
<td>R Rubber</td>
<td>R Rubber</td>
<td>Ribbon Cable, Non-Separable</td>
<td>R Multi-Wire</td>
<td>G With Protective Conductor</td>
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<td></td>
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<tr>
<td></td>
<td>07 450/750 Volt</td>
<td>S Silicone Rubber</td>
<td>N Chloroprene Rubber</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>J Glass-Filament Braiding</td>
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<td></td>
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<td>T Textile Braiding</td>
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</tbody>
</table>

### LICENSING BODIES OF CENELEC

<table>
<thead>
<tr>
<th>Country</th>
<th>Licensing Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUSTRIA</td>
<td>Osterreichischer Verband für Elektrotechnik (OVE)</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>Comité Electrotechnique Belge (CEBEC)</td>
</tr>
<tr>
<td>DENMARK</td>
<td>Danmarks Elektriske Materiel Kontrol (DEMKO)</td>
</tr>
<tr>
<td>FRANCE</td>
<td>Union Technique de l’Electricité (UTE)</td>
</tr>
<tr>
<td>FEDERAL REPUBLIC OF GERMANY</td>
<td>Verband Deutscher Elektrotechniker (VDE) e.V. Prufstelle</td>
</tr>
<tr>
<td>FINLAND</td>
<td>Electrical Inspectorate (SETI)</td>
</tr>
<tr>
<td>GREECE</td>
<td>Hellenic Organization for Standardization (ELOT)</td>
</tr>
<tr>
<td>IRELAND</td>
<td>National Standards Authority of Ireland (NSAI)</td>
</tr>
<tr>
<td>ITALY</td>
<td>Istituto Italiano del Marchio di Qualita (IMQ)</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>N.V. tot Keuring van Elektrotechnische Materialen (KEMA)</td>
</tr>
<tr>
<td>NORWAY</td>
<td>NEMKO</td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>Institute Portugues Da Qualidade (IPQ)</td>
</tr>
<tr>
<td>SPAIN</td>
<td>Asociacion Electrotecnica Y Electronica Espanola</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>Svenska Elektriska Materiel Kontrollanstalten (SEMKO)</td>
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<tr>
<td>SWITZERLAND</td>
<td>Schweizerischer Elektrotechnischer Verein (SEV)</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>B.A.S.E.C. - British Approvals Service for Electric Cables Ltd.</td>
</tr>
</tbody>
</table>
**H05VV-F**

**European PVC Flexible Cordage**

HAR 300/500 V 70°C IEC, CEE Color Code, "CE" MARK

HAR indicates acceptance by: Austria, Belgium, Denmark, Federal Republic of Germany, Finland, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**Applications:**
For use on electronic and electrical equipment designed for export to Europe. Applicable to UL subject 478 (114) Appendix A - Information processing and business equipment intended for use outside the U.S.A. Commonly used on appliances and office machines.

**Construction:**
Bare copper conductors, PVC insulation, conductors cabled, talc, black or gray PVC jacket.

**Technical Data:**
- **Voltage Rating:** 300/500 Volts
- **Temperature Rating:** -15°C to +70°C
- **Minimum Bending Radius for Flexing:** 15 x Outer Diameter
- **Conductor Color Code:**
  - 2 = Blue, Brown
  - 3 = Green/Yellow, Blue, Brown
  - 4 = Green/Yellow, Brown, Black, Grey
  - 5 = Green/Yellow, Blue, Brown, Black, Grey
- **Approval:** HAR

**Standards:**

**Applications:**
For use on electronic and electrical equipment designed for export to Europe. Applicable to UL subject 478 (114) Appendix A - Information processing and business equipment intended for use outside of the U.S.A. Commonly used on appliances and office machines.

**Construction:**
Bare copper conductors, natural or synthetic rubber insulation, talc, conductors cabled, neoprene jacket (black).

**Technical Data:**
- **Voltage Rating:** 450/750 Volts
- **Temperature Rating:** -30°C to +60°C
- **Minimum Bending Radius for Flexing:** 15 x Outer Diameter
- **Conductor Color Code:**
  - 2 = Blue, Brown
  - 3 = Green/Yellow, Blue, Brown
  - 4 = Green/Yellow, Brown, Black, Grey
  - 5 = Green/Yellow, Blue, Brown, Black, Grey
- **Approval:** HAR

**Standards:**
- HD 22.4 S2, HD 308, 361, 383, 385, 402, 405.1, IEC 245.4, 228, 0295 class 5, 245, IEC 66, 304, 332-1, 540, 0282. BS 6500, BS 6360.

---

"UNIVERSAL" SJT PORTABLE CORDAGE, 105°C
UL, CSA, VDE, DEMKO, SEMKO, NEMKO Listed, "CE" MARK
300 Volt

**Construction:**
Bare copper conductors, black jacket.

**Outer Jacket Marked:**
H05VV-F 3G, SJT, 105°C, VW-1, FT2

**Technical Data:**
- **Voltage Rating:** 300 Volts
- **Temperature Rating:** 105°C
- **Conductor Color Code:** Green with Yellow, Brown, Blue
- **Approvals:**
  - UL listed (File E-90165)
  - CSA listed (File LL57355)
  - VDE listed (File 104076)
  - "CE" Mark

### Technical Specifications Table

<table>
<thead>
<tr>
<th>CATALOG NUMBER</th>
<th>CONDUCTORS NO.</th>
<th>CONDUCTORS AWG</th>
<th>STRANDING</th>
<th>NOMINAL DIMENSIONS</th>
<th>AMPS</th>
<th>STANDARD LENGTHS</th>
<th>WEIGHT LBS./M FT.</th>
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</thead>
<tbody>
<tr>
<td>1601318</td>
<td>3</td>
<td>18</td>
<td>41/0.16</td>
<td>0.76 mm</td>
<td>0.76 mm</td>
<td>7.9 mm</td>
<td>10</td>
</tr>
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<td>1601316</td>
<td>3</td>
<td>16</td>
<td>26/0.254</td>
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<td>0.76 mm</td>
<td>8.5 mm</td>
<td>13</td>
</tr>
<tr>
<td>1601314</td>
<td>3</td>
<td>14</td>
<td>41/0.254</td>
<td>0.76 mm</td>
<td>0.76 mm</td>
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<td>15</td>
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<td>1601312</td>
<td>3</td>
<td>12</td>
<td>65/0.254</td>
<td>0.76 mm</td>
<td>1.14 mm</td>
<td>10.5 mm</td>
<td>20</td>
</tr>
<tr>
<td>1601310</td>
<td>3</td>
<td>10</td>
<td>65/0.32</td>
<td>1.14 mm</td>
<td>1.52 mm</td>
<td>14.7 mm</td>
<td>30</td>
</tr>
</tbody>
</table>

**NOTE:** Stranding and outside diameter dimensions are subject to change without prior notice.
Applications:
Recommended for use in electronics and electrical equipment designed for North America and Europe.

One standard product with all the required approvals for the North American and European markets.

Construction:
Stranded copper conductor, PVC insulation.

Approvals:
HAR: H05 V-K
UL: Awm Style 1007, 1569
CSA: TR-64
HAR: H07 V-K
UL: Awm Style 1015
CSA: TEW

Technical Data:
Voltage Rating:
UL / CSA 300V, (H05V-K) 300/500 V
UL / CSA 600V, (H07V-K) 450/750 V

Temperature Rating:
HAR / IEC -5°C to +70°C
UL/CSA to 1 mm² -10°C to +80°C
UL/CSA from 1.5 mm² -10°C to +105°C

Minimum Bending Radius For Flexing:
(H05V-K) 12.5 x O.D.
(H07V-K) 15 x O.D.

Colors Available:
See chart below

Applications:
Recommended for use in electronics and electrical equipment designed for North America and Europe.

One standard product with all the required approvals for the North American and European markets.

Construction:
Stranded copper conductor, PVC insulation.

Approvals:
HAR: H05 V-K
UL: Awm Style 1007, 1569
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CSA: TEW

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UL / CSA 300V, (H05V-K) 300/500 V
UL / CSA 600V, (H07V-K) 450/750 V

Temperature Rating:
HAR / IEC -5°C to +70°C
UL/CSA to 1 mm² -10°C to +80°C
UL/CSA from 1.5 mm² -10°C to +105°C

Minimum Bending Radius For Flexing:
(H05V-K) 12.5 x O.D.
(H07V-K) 15 x O.D.

Colors Available:
See chart below

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UL / CSA 300V, (H05V-K) 300/500 V
UL / CSA 600V, (H07V-K) 450/750 V

Temperature Rating:
HAR / IEC -5°C to +70°C
UL/CSA to 1 mm² -10°C to +80°C
UL/CSA from 1.5 mm² -10°C to +105°C

Minimum Bending Radius For Flexing:
(H05V-K) 12.5 x O.D.
(H07V-K) 15 x O.D.

Colors Available:
See chart below

The complete part number is determined by adding the color number to the part number.

Example:
Part number 9510..1 with Green / Yellow insulation is ordered as part number 9510001.
**EUROPEAN HOOK UP WIRE**  
Types H05 V-K, H07 V-K  

<table>
<thead>
<tr>
<th>CAT. NO.</th>
<th>CONDUCTOR SIZE</th>
<th>NOM. O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H05V-K PVC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4510..1</td>
<td>20 AWG (16/32) 0.5 mm²</td>
<td>0.083</td>
</tr>
<tr>
<td>4510..2</td>
<td>18 AWG (24/32) 0.75 mm²</td>
<td>0.094</td>
</tr>
<tr>
<td>4510..3</td>
<td>17 AWG (32/32) 1 mm²</td>
<td>0.102</td>
</tr>
<tr>
<td><strong>H07V-K PVC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4520..1</td>
<td>16 AWG (30/30) 1.5 mm²</td>
<td>0.118</td>
</tr>
<tr>
<td>4520..2</td>
<td>14 AWG (50/30) 2.5 mm²</td>
<td>0.146</td>
</tr>
<tr>
<td>4520..3</td>
<td>12 AWG (56/28) 4 mm²</td>
<td>0.169</td>
</tr>
<tr>
<td>4520..4</td>
<td>10 AWG (84/26) 6 mm²</td>
<td>0.193</td>
</tr>
<tr>
<td>4520..5</td>
<td>8 AWG (80/26) 10 mm²</td>
<td>0.256</td>
</tr>
<tr>
<td>4520..6</td>
<td>6 AWG (128/24) 16 mm²</td>
<td>0.315</td>
</tr>
<tr>
<td>4521..1</td>
<td>4 AWG (200/26) 25 mm²</td>
<td>0.386</td>
</tr>
<tr>
<td>4521..2</td>
<td>2 AWG (280/26) 35 mm²</td>
<td>0.433</td>
</tr>
<tr>
<td>4521..3</td>
<td>1 AWG (400/26) 50 mm²</td>
<td>0.512</td>
</tr>
<tr>
<td>4521..4</td>
<td>2/0 AWG (560/26) 70 mm²</td>
<td>0.610</td>
</tr>
<tr>
<td>4521..5</td>
<td>3/0 AWG (485/24) 95 mm²</td>
<td>0.669</td>
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<tr>
<td>4521..6</td>
<td>4/0 AWG (514/24) 120 mm²</td>
<td>0.776</td>
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<td>4521..7</td>
<td>300 MCM AWG (765/24) 150 mm²</td>
<td>0.839</td>
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<tr>
<td>4521..8</td>
<td>370 MCM AWG (944/24) 185 mm²</td>
<td>0.925</td>
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<tr>
<td>4521..9</td>
<td>480 MCM AWG (1255/25) 240 mm²</td>
<td>1.079</td>
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</tbody>
</table>

**Applications:**
For use in electronic and electrical equipment designed for export to Europe. Also used in the repair of machinery originally manufactured in Europe.

**Standards:**

**Construction:**
Stranded copper conductor, PVC insulation.  
Fine wire per VDE 0295.

**Technical Data:**
- **Voltage Rating:** (H05V-K) 300/500 V  
  (H07V-K) 450/750 V
- **Temperature Rating:** (H05V-K) -30°C to +70°C  
  (H07V-K) -30°C to +70°C
- **Minimum Bending Radius For Flexing:** (H05V-K) 12.5 x O.D.  
  (H07V-K) 15 x O.D.
- **Colors Available:** See chart below
  Approval: HAR - Conforms to “CE” low voltage directives

**Colors Available:**
<table>
<thead>
<tr>
<th>COLOR NO.</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>GREEN / YELLOW</td>
</tr>
<tr>
<td>01</td>
<td>BLACK</td>
</tr>
<tr>
<td>02</td>
<td>BLUE</td>
</tr>
<tr>
<td>03</td>
<td>BROWN</td>
</tr>
<tr>
<td>04</td>
<td>RED</td>
</tr>
<tr>
<td>05</td>
<td>WHITE</td>
</tr>
<tr>
<td>06</td>
<td>GRAY</td>
</tr>
<tr>
<td>07</td>
<td>VIOLET</td>
</tr>
<tr>
<td>08</td>
<td>PINK</td>
</tr>
<tr>
<td>09</td>
<td>ORANGE</td>
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<tr>
<td>10</td>
<td>TRANSPARENT *</td>
</tr>
<tr>
<td>11</td>
<td>YELLOW *</td>
</tr>
<tr>
<td>12</td>
<td>GREEN *</td>
</tr>
<tr>
<td>13</td>
<td>BEIGE</td>
</tr>
<tr>
<td>14</td>
<td>DARK BLUE</td>
</tr>
</tbody>
</table>

* = NOT HAR

The complete part number is determined by adding the color number to the part number.

**Example:**
Part number 4510..1 with Green / Yellow insulation is ordered as part number 4510001.

<HAR> Green / Yellow Ground: For every 15 mm of length of insulation, one of the colors (green or yellow) must cover at least 30% and not more than 70% of the insulation surface, the other color covering the remainder.
Patented Security:
Patent No. P-2631996

International Approvals:
UL No. E79903  VDE No. 57986
CSA No. LR50370-10  SEV No. 100989

Technical Data:
Protection: Up to 70 PSI
Material: Polyamide — flame retardant, self-extinguishing nylon with neoprene gland.
Working Temperature: -22°F (-30°C) to 212°F (100°C) and up to 302°F (150°C) for short periods of time.
Seal: IP 68 (International Protection — highest grade), comparable to NEMA 6 classification.
First digit (0-6): Dust Protection
Second digit (0-8): Water Spray Protection
Resistant to: Salt water, weak acids, weak alkalis, alcohol, ester, ketones, ether, benzine, gas, mineral oil, animal and vegetable oils, gasoline, oil, grease and common solvents.

New technically advanced features meet the most stringent demands of safety and operational reliability. Can be used in panels, switches, control equipment and is most commonly used within the machine tool industry. A strain relief and a liquid-tight seal — all in one connector.

Internationally Approved:
Internationally tested and accepted by: UL, CSA, VDE, SEV.

Optimum Seal:
A special interior flange construction of two sealing rings molded at the body of the gland plus a high quality neoprene bushing are additional safeguards that insure an impervious seal — NEMA 6 Classification.

Unique Design:
Outperforms traditional connectors because the design consists of three parts which do not require dismantling before use.
The internal ratchet mechanism allows the cap to be tightened without twisting the cord as it compresses, pushing the collet fingers together to form a liquid-tight seal with the neoprene compression gland.

Vibration-Proof Protection:
An integrated locking mechanism that includes an internal ratchet inside the sealing portion of the connector provides a self-locking and vibration-proof fixing element that prevents the cap from detaching even when subjected to severe vibration.

Quick Installation:
New multi-trapezoidal thread requires just one twist to tighten the dome cap — automatically adjusting to the size of the cable and providing optimum strain relief and liquid-tight seal.

Heavy Duty Design:
• Higher pull out strength
• Highly reliable strain relief

New Cap Design for Easier Handling:
Larger ergonomic design and ridges of the dome cap makes for easy gripping and mounting by hand or wrench.

Larger Variable Clamping Range:
The uniquely designed collet accommodates a broad range of cords, tubes and cable diameters resulting in a reduction in the number of glands required in inventory.

Resistant to Impact at Low Temperatures:
Can withstand impact at low temperatures of -30°C.
# STRAIN RELIEF CORD CONNECTORS
Liquid-Tight (IP 68)  UL, CSA, VDE

## STANDARD TYPE

![Diagram of STANDARD TYPE connector](image)

## FLEX TYPE

![Diagram of FLEX TYPE connector](image)

## LOCKING NUT

![Diagram of LOCKING NUT](image)

## Thread Major Pitch

<table>
<thead>
<tr>
<th>Thread Size*</th>
<th>Major Diameter (mm)</th>
<th>Pitch (mm)</th>
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</thead>
<tbody>
<tr>
<td>PG 07</td>
<td>12.5</td>
<td>1.27</td>
</tr>
<tr>
<td>PG 09</td>
<td>15.2</td>
<td>1.41</td>
</tr>
<tr>
<td>PG 11</td>
<td>18.6</td>
<td>1.41</td>
</tr>
<tr>
<td>PG 13.5</td>
<td>20.4</td>
<td>1.41</td>
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<tr>
<td>PG 16</td>
<td>22.5</td>
<td>1.41</td>
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<tr>
<td>PG 21</td>
<td>28.3</td>
<td>1.59</td>
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<tr>
<td>PG 29</td>
<td>37.0</td>
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<td>PG 36</td>
<td>47.0</td>
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</tr>
<tr>
<td>PG 48</td>
<td>59.3</td>
<td>1.59</td>
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* Steel Conduit Thread 10 per DIN 40430

## ALL DIMENSIONS ARE IN INCHES

<table>
<thead>
<tr>
<th>CATALOG NUMBER (BLACK)</th>
<th>DIAMETER RANGE</th>
<th>&quot;A&quot; MOUNTING HOLE CLEARANCE</th>
<th>&quot;B&quot; MAXIMUM OVERALL LENGTH</th>
<th>&quot;C&quot; THREAD LENGTH .315</th>
<th>&quot;D&quot; WRENCHING NUT THICKNESS</th>
<th>&quot;E&quot; WRENCHING FLATS</th>
<th>&quot;F&quot; LOCKNUT THICKNESS</th>
<th>&quot;G&quot; LOCKNUT DIAMETER</th>
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<tbody>
<tr>
<td>METRIC PG THREAD - STANDARD TYPE</td>
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<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>CATALOG NUMBER (BLACK)</th>
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<th>&quot;E&quot; WRENCHING FLATS</th>
<th>&quot;F&quot; LOCKNUT THICKNESS</th>
<th>&quot;G&quot; LOCKNUT DIAMETER</th>
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<tr>
<td>METRIC PG THREAD - FLEX TYPE</td>
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</tbody>
</table>

## NOTE:
Last 2 digits of catalog number indicate “PG” thread size as per above table.