



## MTS Criterion® & Exceed® Accessories

Grips, fixtures, load cells & other accessories for monotonic testing

be certain.

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# Introduction to Grips and Test Fixtures

## Grips and Fixtures for Electromechanical Systems

MTS complements its electromechanical testing lines with a comprehensive array of accessories to conduct a full spectrum of material and small component testing – from basic quality control, to complex biomedical simulations, to demanding research and development applications. This catalog includes several distinct accessory families to accommodate your specific and evolving testing needs:

### MTS Advantage Accessories

Highly versatile and full-featured wedge, pneumatic, and screw action grips for demanding R&D testing of advanced composites and alloys. Ideal for the specific needs of the high-end researcher, this accessory family accommodates a very broad range

of clamping force and temperature requirements and features numerous control and grip face options. MTS stands behind the MTS Advantage family line with a three-year warranty – one of the best in the industry!



### MTS Fundamental Accessories

Basic affordable grips and fixtures for standard testing of plastics, textiles, rubber, wire, rope, and more. These accessories feature a universal adapter design and optional threaded frame adapters to facilitate easy installation

onto both MTS electromechanical and servohydraulic load frame systems, as well as other electromechanical test systems. Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability.



Criterion  
Test Systems

## Introduction to Grips and Test Fixtures

### Bionix Accessories

Affordable and extremely durable grips, fixtures, and platens for accurately replicating biomaterial and medical device service environments and extending the utility of Bionix electromechanical and servohydraulic test solutions. These accessories feature a universal adapter design

and optional threaded frame adapters. This facilitates easy installation onto both MTS electromechanical and servohydraulic load frame systems as well as other electromechanical test systems. Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability.



### Composites Accessories

Advanced lightweight composite materials are improving product design and creating sleeker and safer solutions. MTS offers a comprehensive array of accessories to fulfill a full spectrum of polymer matrix composites material testing –

from basic quality control, to demanding research and development applications. Composites tests demand greater fidelity, more detailed measurement techniques, tighter integration with computer models and the ingenuity to deal with new materials and applications.

### Can't find what you need?

We offer many more grips and fixtures. Contact your local sales representative or applications engineer to find the model that meets your exact needs.



Exceed  
Test Systems

# Introduction to Grips and Test Fixtures

## Application of Grips and Fixtures

Grips and fixtures are critical components to material testing. Testing results might be compromised if incorrect grips or fixtures are used. MTS offers a large variety of grips and fixtures and this catalog includes popular items that are compatible with specimens defined by commonly adopted testing standards such as ASTM, ISO, DN, GB, BS, JIS and more. For additional grips and fixtures or custom designs, please contact MTS sales or application engineers.

## Selection of Grips and Fixtures

Four main criteria to consider when selecting grips and fixtures:

### 1. TEST STANDARD

Test standards define the dimensions and shape of specimens. Often, there are many different grips that can be used to address a single test standard. If you are not certain about which grip to use for your application, please contact us.

### 2. SPECIMEN AND TEST METHOD

Besides the dimension and shape of specimens, the surface texture is an important factor in grip selections. For tensile tests, slipping, premature damage and cracking in the grip are quite common due to incorrect grip selection. For help determining the right grip, contact your MTS application engineer.

### 3. ATTACHMENT KITS

The term “attachment kit” can refer to any of the hardware required to connect your grips to your system. This is an important item to remember since the attachment kits are generally sold separately.

### 4. STANDARD ADAPTERS

Generally grips and fixtures will be equipped with adapters of standard dimensions to be used with clevis adapters of the frames. The advantages of using standard adapters are easy installation, accurate mounting and maximum compatibility.



## Electromechanical Attachment Scheme

| Clevis Pin Connection      | Type B               | Type C (AL)           | Type C (STL)          | Type D                | Type E                | Type F                 | Type 20             | Type 40               |
|----------------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|---------------------|-----------------------|
| <b>Max. Load Capacity</b>  | 10 N<br>(2.2 lbf)    | 200 N<br>(45 lbf)     | 2.5 kN<br>(562 lbf)   | 150 kN<br>(33720 lbf) | 300 kN<br>(67440 lbf) | 600 kN<br>(134885 lbf) | 30 kN<br>(6740 lbf) | 100 kN<br>(22480 lbf) |
| <b>Clevis Diameter (X)</b> | 12.7 mm<br>(0.50 in) | 15.9 mm<br>(0.625 in) | 15.9 mm<br>(0.625 in) | 31.7 mm<br>(1.25 in)  | 60 mm<br>(2.36 in)    | 90 mm<br>(3.54 in)     | 20 mm<br>(0.787 in) | 40 mm<br>(1.57 in)    |
| <b>Pin Diameter (Y)</b>    | 4.7 mm<br>(0.186 in) | 6.4 mm<br>(0.25 in)   | 6.4 mm<br>(0.25 in)   | 12.7 mm<br>(0.50 in)  | 28 mm<br>(1.1 in)     | 40 mm<br>(1.57 in)     | 10 mm<br>(0.039 in) | 18 mm<br>(0.71 in)    |

## Adapters

### Conversion Adapters

Grips and fixtures with other standard adapters can be used on the frames with other size standard clevis adapters with a set of suitable conversion adapters.

Conversion adapters allow you to use the same grips and fixtures on both MTS Exceed and MTS Criterion load frames.



### Specifications

| Part Number                  | 100-302-950         | 100-302-947       | 100-302-952         | 100-302-948       | 100-302-951           | 100-302-953           | 100-302-949           | 100-260-836           | 100-281-224           |
|------------------------------|---------------------|-------------------|---------------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>Attachment Type (m-f)</b> | 20-D                | 40-20             | D-20                | E-20              | 40-D                  | D-40                  | E-40                  | E-D                   | F-E                   |
| <b>Max. Load Capacity</b>    | 30 kN<br>(6740)     | 30 kN<br>(6740)   | 30 kN<br>(6740)     | 30 kN<br>(6740)   | 100 kN<br>(22480 lbf) | 100 kN<br>(22480 lbf) | 100 kN<br>(22480 lbf) | 150 kN<br>(33720 lbf) | 300 kN<br>(67440 lbf) |
| <b>A (male clevis)</b>       | Type 20             | Type 40           | Type D              | Type E            | Type 40               | Type D                | Type E                | Type E                | Type F                |
| <b>B (female clevis)</b>     | Type D              | Type 20           | Type 20             | Type 20           | Type D                | Type 40               | Type 40               | Type D                | Type E                |
| <b>C (pin to pin height)</b> | 68.5 mm<br>(2.7 in) | 58 mm<br>(2.3 in) | 72.5 mm<br>(2.9 in) | 80 mm<br>(3.2 in) | 91 mm<br>(3.6 in)     | 89.5 mm<br>(3.5 in)   | 90 mm<br>(3.5 in)     | 97 mm<br>(3.8 in)     | 160 mm<br>(6.3 in)    |
| <b>Lock Nut</b>              | M24 × 1.5           | M45 × 2           | M35 × 1.5           | M64 × 2           | M45 × 2               | M35 × 1.5             | M64 × 2               | M64 × 2               | M95 × 2               |

### Universal Joint

Universal joints are used to help maintain axial load alignment in tensile loading applications

### Specifications

|                           |                                |
|---------------------------|--------------------------------|
| <b>Model</b>              | <b>FWX105</b>                  |
| <b>Part Number</b>        | 100-258-159                    |
| <b>Grip Type</b>          | Universal Joint                |
| <b>Force Capacity</b>     | 100 kN (22,000 lbf)            |
| <b>Upper Grip Weight</b>  | 3.9 kg (8.6 lbs)               |
| <b>Temperature Rating</b> | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>    | D                              |
| <b>Grip Height</b>        | 185 mm (7.3 in)                |
| <b>Grip Width</b>         | 84 mm (3.4 in)                 |



Universal Joint

# Tension Grips

## Hydraulic Activation

### Model 647 Hydraulic Wedge Grips

- » Precision, high-performance hydraulic wedge grips with the built-in versatility to support a wide range of tensile applications
- » Symmetrical housing design ensures an even specimen loading across the entire face of the wedge
- » Grips clamp onto your specimen in the same position, test after test, to minimize the bending strains that can invalidate your test results
- » Lateral movement of the wedges won't change the gripping position on the specimen once the grips are activated
- » Side loading capability for easy specimen insertion
- » Adjustable pressure allows grips to be used for testing a variety of materials
- » Grips are sold in pairs
- » Wide variety of wedges (specimen interfaces) are available to meet your varied requirements
- » All specimen interfaces (wedges) are sold separately
- » Hydraulic grip controller/supply sold separately
- » **Applications:** High-precision tensile testing of metals, ceramics, composites, plastics, wood/paper products
- » *See pages 28-33 for wedge options*
- » *See pages 41-42 for grip controller options*



### Specifications

| Model                                   | 647.02B                            | 647.10A                            | 647.25A                            | 647.50A                         |
|-----------------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------------------------|
| <b>Part Number</b>                      | 056-670-901                        | 047-080-605                        | 047-080-905                        | 047-595-505                     |
| <b>Grip Type</b>                        | Hydraulic Wedge                    | Hydraulic Wedge                    | Hydraulic Wedge                    | Hydraulic Wedge                 |
| <b>Force Capacity</b>                   | 30 kN (6,740 lbf)                  | 100 kN (22,480 lbf)                | 300 kN (66,440 lbf)                | 550 kN (123,650 lbf)            |
| <b>Upper Grip Weight</b>                | 7 kg (15.4 lb)                     | 30 kg (66.1 lb)                    | 77 kg (170 lb)                     | 148 kg (324 lb)                 |
| <b>Temperature Rating</b>               | -40° C (-40° F) to 177° C (350° F) | -40° C (-40° F) to 177° C (350° F) | -40° C (-40° F) to 177° C (350° F) | -18° C (0° F) to 65° C (150° F) |
| <b>Attachment Type</b>                  | D                                  | M27 x 2                            | M36 x 2                            | M52 x 2                         |
| <b>Combined Upper/Lower Grip Height</b> | 396 mm (15.6 in)                   | 390 mm (15.2 in)                   | 490 mm (19.2 in)                   | 620 mm (24.4 in)                |
| <b>Grip Width</b>                       | 180 mm (7.1 in)                    | 180 mm (7.1 in)                    | 295 mm (11.6 in)                   | 358 mm (14.1 in)                |
| <b>Maximum Input Pressure</b>           | 20 MPa (3,000 psi)                 | 20 MPa (3,000 psi)                 | 70 MPa (10,000 psi)                | 70 MPa (10,000 psi)             |

# Tension Grips

Hydraulic Activation

## MTS Fundamental Hydraulic Side Grips

- » Affordable hydraulic side grips that deliver constant gripping force for tensile applications
- » Side-loading, quick-acting U-shaped grips allow for easy specimen insertion
- » Stable clamping force minimizes slipping and maximizes accuracy and repeatability
- » Capable of off-center specimen tests
- » Adjustable pressure provides proper grip force for a variety of materials
- » Grips are sold in pairs
- » Wide variety of specimen interfaces are available to meet your varied differing specimen profiles, materials and surfaces
- » All specimen interfaces ("faces") are sold separately
- » Hydraulic grip controller/supply unit is sold separately
- » **Applications:** High-force tensile testing of steel, rebar, ceramics, composites, plastics and wood/paper products
- » See pages 41-42 for grip controller options



## Specifications

| Model                                   | FDYA504A                       | FDYB105A                       |
|-----------------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-408-988                    | 100-302-638                    |
| <b>Grip Type</b>                        | Hydraulic Single Side          | Hydraulic Single Side          |
| <b>Force Capacity</b>                   | 50 kN (11,000 lbf)             | 100 kN (22,500 lbf)            |
| <b>Upper Grip Weight</b>                | 25 kg (55.1 lb)                | 42 kg (92.6 lb)                |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | D                              | D                              |
| <b>Combined Upper/Lower Grip Height</b> | 446 mm (17.6 in)               | 506 mm (19.9 in)               |
| <b>Grip Width</b>                       | 301 mm (11.9 in)               | 358 mm (14.1 in)               |
| <b>Maximum Input Pressure</b>           | 20 MPa (3000 psi)              | 20 MPa (3000 psi)              |

## FDYA504A Optional Faces

| Model              | Part Number | Profile | Surface        | Height         | Width          | Temperature Range              | Specimen Range          |
|--------------------|-------------|---------|----------------|----------------|----------------|--------------------------------|-------------------------|
| <b>FDYA504A.03</b> | 100-302-842 | Flat    | Sawtooth Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | 0-18 mm (0-0.7 in)      |
| <b>FDYA504A.04</b> | 100-302-843 | Vee     | Serrated Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | ø4-ø12 mm (0.2-0.5 in)  |
| <b>FDYA504A.05</b> | 100-302-844 | Vee     | Serrated Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | ø12-ø20 mm (0.5-0.8 in) |

## FDYB105A Optional Faces

| Model              | Part Number | Profile | Surface        | Height         | Width          | Temperature Range              | Specimen Range          |
|--------------------|-------------|---------|----------------|----------------|----------------|--------------------------------|-------------------------|
| <b>FDYB105A.03</b> | 100-302-845 | Flat    | Sawtooth Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | 0-28 mm (0-1.1 in)      |
| <b>FDYB105A.04</b> | 100-302-846 | Vee     | Serrated Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | ø4-ø12 mm (0.2-0.5 in)  |
| <b>FDYB105A.05</b> | 100-302-847 | Vee     | Serrated Steel | 60 mm (2.3 in) | 98 mm (3.8 in) | 0° C (32° F) to 50° C (122° F) | ø12-ø28 mm (0.5-1.1 in) |

# Tension Grips

Hydraulic Activation

## MTS Fundamental Hydraulic Wedge Grips

- » Affordable hydraulic wedge grips for higher force capacity tensile applications
- » Side loading capability for easy specimen insertion
- » Grips are sold in pairs
- » Wide variety of wedges (specimen interfaces) are available to meet your varied requirements
- » All specimen interfaces (wedges) are sold separately
- » Hydraulic grip controller/supply unit is sold separately
- » **Applications:** High-precision tensile testing of metals, ceramics, composites, plastics, wood/paper products
- » See page 36 for wedge options
- » See pages 41-42 for grip controller options



## Specifications

| Model                            | FYD305                         | FYD605                         |
|----------------------------------|--------------------------------|--------------------------------|
| Part Number                      | 100-336-772                    | 100-369-052                    |
| Grip Type                        | Hydraulic Wedge                | Hydraulic Wedge                |
| Force Capacity                   | 300 kN (66,440 lbf)            | 600 kN (134,885 lbf)           |
| Upper Grip Weight                | 92.5 kg (204 lb)               | 165 kg (364 lb)                |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| Attachment Type                  | E                              | M52 x 2                        |
| Combined Upper/Lower Grip Height | 756 mm (29.8 in)               | 976 mm (38.4 in)               |
| Grip Width                       | 270 mm (10.6 in)               | 330 mm (13 in)                 |
| Maximum Input Pressure           | 20 MPa (3,000 psi)             | 20 MPa (3,000 psi)             |

# Tension Grips

Pneumatic Activation

## Model 645 Pneumatic Wedge Grips

- » High-performance, reliable pneumatic wedge grips with the built-in versatility to support a wide range of tensile applications
- » Symmetrical housing design ensures an even specimen loading across the entire face of the wedge
- » Grips clamp onto your specimen in the same position, test after test, to minimize the bending strains that can invalidate your test results
- » Lateral movement of the wedges won't change the gripping position on the specimen once the grips are activated
- » Side loading capability for easy specimen insertion
- » Adjustable pressure allows grips to be used for testing a variety of materials
- » Grips are sold in pairs
- » Wide variety of wedges are available to meet your varied requirements
- » Wide variety of wedges (specimen interfaces) are available to meet your varied requirements
- » All specimen interfaces (wedges) are sold separately
- » Operation requires a dry, filtered air supply sold separately
- » Pneumatic gripping controller is sold separately
- » **Applications:** Tensile testing of metals, ceramics, composites, plastics, wood/paper products
- » See page 43 for grip controller options

## Specifications

| Model                                   | 645.002                                                      | 645.005                                                      |
|-----------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| <b>Part Number</b>                      | 100-242-422                                                  | 100-242-417                                                  |
| <b>Grip Type</b>                        | Pneumatic Wedge                                              | Pneumatic Wedge                                              |
| <b>Force Capacity</b>                   | 2 kN (0.44kip)                                               | 5 kN (1.1 kip)                                               |
| <b>Upper Grip Weight</b>                | 1.76 kg (3.9 lb)                                             | 2.81 kg (6.2 lb)                                             |
| <b>Temperature Rating</b>               | - 40° C (-40° F) to 200° C (400° F)                          | - 40° C (-40° F) to 200° C (400° F)                          |
| <b>Attachment Type</b>                  | D                                                            | D                                                            |
| <b>Combined Upper/Lower Grip Height</b> | 369.8 mm (14.5 in)                                           | 375.4 mm (14.8 in)                                           |
| <b>Grip Width</b>                       | 104 mm (4.1 in)                                              | 147 mm (5.8 in)                                              |
| <b>Maximum Input Pressure</b>           | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            |
| <b>Compatible Grip Controller Type</b>  | MTS Fundamental Dual Acting Pneumatic Grip Controller/Supply | MTS Fundamental Dual Acting Pneumatic Grip Controller/Supply |



## Model 645 Optional Wedges

| Model             | Part Number | Profile | Surface           | Height         | Width          | Temperature Range                  | Specimen Range                                            | Compatible Grip(s) |
|-------------------|-------------|---------|-------------------|----------------|----------------|------------------------------------|-----------------------------------------------------------|--------------------|
| <b>645.005.01</b> | 050-507-938 | Flat    | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 0-7.2 mm (0-0.28 in)                                      | 645.002, 645.005   |
| <b>645.005.02</b> | 050-507-939 | Flat    | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 3.3-10.6 mm (0.13-0.42 in)                                | 645.002, 645.005   |
| <b>645.005.03</b> | 050-507-940 | Flat    | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 5.4-12.4 mm (0.21-0.49 in)                                | 645.002, 645.005   |
| <b>645.005.04</b> | 050-507-941 | Flat    | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 0-7.2 mm (0-0.28 in)                                      | 645.002, 645.005   |
| <b>645.005.05</b> | 050-507-942 | Flat    | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 3.3-10.6 mm (0.13-0.42 in)                                | 645.002, 645.005   |
| <b>645.005.06</b> | 050-507-943 | Flat    | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | 5.4-12.4 mm (0.21-0.49 in)                                | 645.002, 645.005   |
| <b>645.005.07</b> | 050-507-944 | Vee     | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | ø3-7.8 mm (0.12-0.31 in) Side, ø9.4 mm (0.37 in) Top      | 645.002, 645.005   |
| <b>645.005.08</b> | 050-507-945 | Vee     | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | ø7.1-7.8 mm (0.28-0.31 in) Side, ø12.7 mm (0.50 in) Top   | 645.002, 645.005   |
| <b>645.005.09</b> | 050-507-946 | Vee     | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F) | ø10.9-13.2 mm (0.43-0.52 in) Side, ø16.5 mm (0.65 in) Top | 645.002, 645.005   |

## Tension Grips

### Pneumatic Activation

#### MTS Fundamental Bollard Grips

- » Affordable pneumatic gripping mechanism minimizes specimen slippage
- » “Horn” style design reduces stress concentration on specimens and avoids grip-induced failures.
- » Adjustable pressure allows clamping forces to be used for testing a variety of materials
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » Operation requires a dry, filtered air supply sold separately
- » Pneumatic gripping controller sold separately
- » **Applications:** Tensile testing of cords, filaments, fibers, fine wire, yarns
- » See page 43 for grip controller options



#### Specifications

| Model                            | FCQA502A                                                     | FPB503                                                       |
|----------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| Part Number                      | 100-231-830                                                  | 100-139-065                                                  |
| Grip Type                        | Pneumatic Bollard                                            | Pneumatic Bollard                                            |
| Force Capacity                   | 0.5 kN (112 lbf)                                             | 5 kN (1,125 lbf)                                             |
| Upper Grip Weight                | 1.12 kg (2.4 lb)                                             | 2 kg (4.4 lbs))                                              |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F)                               | -40° C (-40° F) to 80° C (176° F)                            |
| Attachment Type                  | D                                                            | D                                                            |
| Combined Upper/Lower Grip Height | 326 mm (12.8 in)                                             | 410 mm (16 in)                                               |
| Grip Width                       | 154 mm (6.0 in)                                              | 198 mm (7.8 in)                                              |
| Maximum Input Pressure           | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            |
| Compatible Grip Controller Type  | MTS Fundamental Dual Acting Pneumatic Grip Controller/Supply | MTS Advantage Single Acting Pneumatic Grip Controller/Supply |

#### Integrated Specimen Interface

|                |                      |                     |
|----------------|----------------------|---------------------|
| Profile        | Flat                 | Flat                |
| Surface        | Smooth Steel         | Smooth Steel        |
| Minimum Length | 300 mm (11.8 in)     | 255 mm (10 in)      |
| Specimen Range | 0-1.5 mm (0-0.04 in) | ø0-5 mm (ø0-0.2 in) |

# Tension Grips

Pneumatic Activation

## MTS Advantage Pneumatic Vise Grips

- » Versatile, high-performance pneumatic vise grips designed for a wide range of tensile applications
- » Designed and machined to precise tolerances, eliminating side loads
- » Lightweight to perform low force tests while minimizing your low-capacity load cells capacity
- » Dual-acting grip faces simultaneously move to the centerline of the grip to ensure correct specimen alignment and eliminate bending strains
- » Grips are sold in pairs
- » All specimen interfaces ("faces") are sold separately
- » Operation requires a dry, filtered air supply sold separately
- » Pneumatic gripping controller sold separately
- » **Applications:** Tensile testing of low-breaking-strength specimens, thin sheets, films, tapes, elastomers, plastics, rigid and semi-rigid films and sheets
- » See pages 28, 37, 38, 39 for face options
- » See page 43 for grip controller options



## Specifications

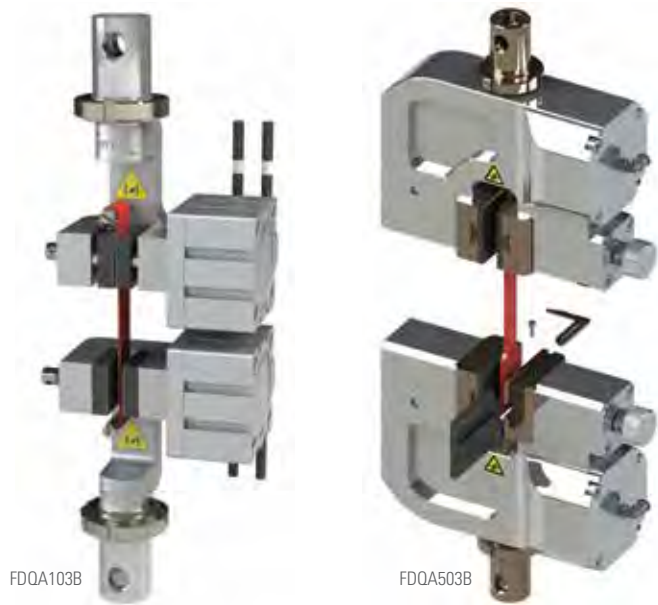
| Model                                   | APG101                                                       | APG202                                                       | APG203                                                       | APG104                                                       |
|-----------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| <b>Part Number</b>                      | 100-032-017                                                  | 100-036-576                                                  | 100-280-342                                                  | 100-034-623                                                  |
| <b>Grip Type</b>                        | Pneumatic Vise                                               | Pneumatic Vise                                               | Pneumatic Vise                                               | Pneumatic Wedge                                              |
| <b>Force Capacity</b>                   | 0.01 kN (2.25 lbf)                                           | 0.2 kN (45 lbf)                                              | 2 kN (450 lbf)                                               | 10 kN (2200 lbf)                                             |
| <b>Upper Grip Weight</b>                | 0.27 kg (0.6 lb)                                             | 1 kg (2.2 lb)                                                | 3.2 kg (7.0 lb)                                              | 6.8 kg (15 lb)                                               |
| <b>Temperature Rating</b>               | -40° C (-40° F) to 200° C (400° F)                           | -40° C (-40° F) to 200° C (400° F)                           | -40° C (-40° F) to 200° C (400° F)                           | -40° C (-40° F) to 200° C (400° F)                           |
| <b>Attachment Type</b>                  | B                                                            | C                                                            | D                                                            | D                                                            |
| <b>Combined Upper/Lower Grip Height</b> | 326 mm (12.8 in)                                             | 360 mm (14.2 in)                                             | 454 mm (17.8 in)                                             | 396 mm (15.6 in)                                             |
| <b>Grip Width</b>                       | 71 mm (2.8 in)                                               | 114 mm (4.5 in)                                              | 147 mm (5.8 in)                                              | 210 mm (8.3 in)                                              |
| <b>Maximum Input Pressure</b>           | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            |
| <b>Compatible Grip Controller Type</b>  | MTS Advantage Single Acting Pneumatic Grip Controller/Supply | MTS Advantage Single Acting Pneumatic Grip Controller/Supply | MTS Advantage Single Acting Pneumatic Grip Controller/Supply | MTS Advantage Single Acting Pneumatic Grip Controller/Supply |

# Tension Grips

Pneumatic Activation

## MTS Fundamental Pneumatic Vise Grips

- » Affordable pneumatic vise grips designed for a wide range of tensile applications
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Operation requires a dry, filtered air supply sold separately
- » Pneumatic gripping controller sold separately
- » **Applications:** Tensile testing of paper, plastic film, textiles, sheet materials and packaging components
- » *See page 43 for grip controller options*



## Specifications

| Model                                   | FDQA103B                                                     | FDQA503B                                                     |
|-----------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| <b>Part Number</b>                      | 100-231-831                                                  | 100-279-862                                                  |
| <b>Grip Type</b>                        | Pneumatic Vise                                               | Pneumatic Vise                                               |
| <b>Force Capacity</b>                   | 1 kN (225 lbf)                                               | 5 kN (1,125 lbf)                                             |
| <b>Upper Grip Weight</b>                | 1.26 kg (2.7 lb)                                             | 5.48 kg (12.1 lb)                                            |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F)                               | 0° C (32° F) to 50° C (122° F)                               |
| <b>Attachment Type</b>                  | D                                                            | D                                                            |
| <b>Combined Upper/Lower Grip Height</b> | 330 mm (13 in)                                               | 430 mm (16.9 in)                                             |
| <b>Grip Width</b>                       | 130 mm (5.1 in)                                              | 231 mm (9.1 in)                                              |
| <b>Maximum Input Pressure</b>           | 0.55 MPa (80 PSI)                                            | 0.55 MPa (80 PSI)                                            |
| <b>Compatible Grip Controller Type</b>  | MTS Fundamental Dual Acting Pneumatic Grip Controller/Supply | MTS Advantage Single Acting Pneumatic Grip Controller/Supply |

## FDQA103B Integrated Specimen Interface

|                       |                   |
|-----------------------|-------------------|
| <b>Profile</b>        | Flat              |
| <b>Surface</b>        | Rubber            |
| <b>Height</b>         | 30 mm (1.2 in)    |
| <b>Width</b>          | 35 mm (1.4 in)    |
| <b>Specimen Range</b> | 0-8 mm (0-0.3 in) |

## FDQA503B Optional Specimen Interfaces

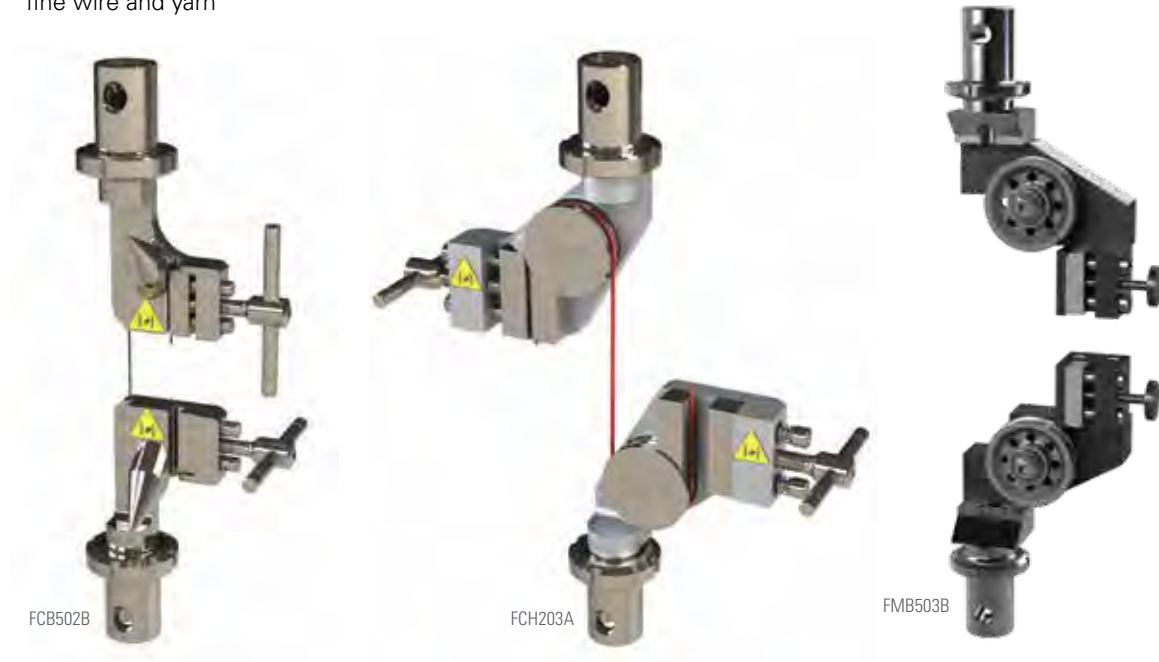
| Model              | Part Number | Profile | Surface  | Height       | Width          | Temperature Range              | Specimen Range      |
|--------------------|-------------|---------|----------|--------------|----------------|--------------------------------|---------------------|
| <b>FDQA503B.01</b> | 100-281-153 | Flat    | Rubber   | 50 mm (2 in) | 60 mm (2.4 in) | 0° C (32° F) to 50° C (122° F) | 0-14 mm (0-0.55 in) |
| <b>FDQA503B.02</b> | 100-281-154 | Flat    | Sawtooth | 50 mm (2 in) | 60 mm (2.4 in) | 0° C (32° F) to 50° C (122° F) | 0-14 mm (0-0.55 in) |

# Tension Grips

## Manual Activation

### MTS Fundamental Bollard Grips

- » Affordable grips designed to reduce stress concentration on specimens and avoid grip-induced failures
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile tests of cords, filaments, fibers, fine wire and yarn



### Specifications

| Model                                   | FCB502B                        | FCH203A                        | FMB503A                            | FMB503B                            |
|-----------------------------------------|--------------------------------|--------------------------------|------------------------------------|------------------------------------|
| <b>Part Number</b>                      | 100-231-828                    | 100-231-829                    | 100-034-764                        | 100-034-765                        |
| <b>Grip Type</b>                        | Manual Bollard                 | Manual Bollard                 | Manual Bollard                     | Manual Bollard                     |
| <b>Force Capacity</b>                   | 0.5 kN (112 lbf)               | 2 kN (450 lbf)                 | 5 kN (1,125 lbf)                   | 5 kN (1,125 lbf)                   |
| <b>Upper Grip Weight</b>                | 0.91 kg (2.0 lb)               | 1.07 kg (2.4 lb)               | 0.84 kg (1.8 lbs)                  | 1.1 kg (2.4 lbs)                   |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | -40° C (-40° F) to 200° C (392° F) | -40° C (-40° F) to 200° C (392° F) |
| <b>Attachment Type</b>                  | D                              | D                              | D                                  | D                                  |
| <b>Combined Upper/Lower Grip Height</b> | 280 mm (11 in)                 | 316 mm (12.4 in)               | 310 mm (12.2 in)                   | 368 mm (14.4 in)                   |
| <b>Grip Width</b>                       | 114.4 mm (2.3 in)              | 177 mm (7.0 in)                | 108 mm (4.2 in)                    | 134 mm (5.3 in)                    |

### Integrated Specimen Interface

| Profile               | Flat                   | Flat                   | Flat                 | Flat                 |
|-----------------------|------------------------|------------------------|----------------------|----------------------|
| <b>Surface</b>        | Smooth Steel           | Smooth Steel           | Sawtooth Steel       | Sawtooth Steel       |
| <b>Minimum Length</b> | 190 mm (7.5 in)        | 250 mm (4.8 in)        | 300 mm (11.8 in)     | 450 mm (17.7 in)     |
| <b>Specimen Range</b> | ø0-1.5 mm (ø0-0.04 in) | ø0-1.5 mm (ø0-0.04 in) | ø0-4 mm (ø0-0.16 in) | ø0-6 mm (ø0-0.23 in) |

# Tension Grips

## Manual Activation

### MTS Fundamental High Force Bollard Grips

- » Affordable grips designed to reduce stress concentration on specimens and avoid grip-induced failures
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Higher force tensile tests of cords, filaments, fibers, fine wire, and yarn



### Specifications

| Model                            | FCA104B                        | ZLD204                         | FMB205                         |
|----------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Part Number                      | 100-258-157                    | 100-302-722                    | 100-409-047                    |
| Grip Type                        | Manual Bollard                 | Manual Bollard                 | Manual Bollard                 |
| Force Capacity                   | 10 kN (2,250 lbf)              | 20 kN (4,500 lbf)              | 200 kN (45,000 lbf)            |
| Upper Grip Weight                | 2.2 kg (4.8 lb)                | 2.07 kg (4.6 lb)               | 21.5 kg (47.4 lb)              |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| Attachment Type                  | D                              | 20                             | E                              |
| Combined Upper/Lower Grip Height | 430 mm (16.9 in)               | 514 mm (20.2 in)               | 740 mm (29.1 in)               |
| Grip Width                       | 166 mm (6.5 in)                | 55 mm (2.2 in)                 | 281 mm (11 in)                 |

### Integrated Specimen Interface

| Profile        | Flat                 | Flat                 | Flat                     |
|----------------|----------------------|----------------------|--------------------------|
| Surface        | Sawtooth Steel       | Smooth Steel         | Smooth Steel             |
| Minimum Length | 650 mm (25.6 in)     | 1040 mm (41 in)      | 3500 mm (137 in)         |
| Specimen Range | ø0-2 mm (ø0-0.08 in) | ø0-15 mm (ø0-0.2 in) | ø8-12 mm (ø0.31-0.47 in) |

## Tension Grips

### Manual Activation

#### MTS Fundamental Nut & Bolt Grips

- » Affordable nut and bolt grips that enable tension, proof load and wedge load tests
- » Accommodates two types of loading plates and a selection of inserts for testing bolts on a wide range of thread configurations and a wide range of nut configurations
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » All specimen interfaces (inserts) are sold separately
- » **Applications:** Tensile, proof load and wedge load tests of bolts, screws, studs, nuts, washers, and rivets
- » *See page 40 for insert options*



#### Specifications

| Model                            | FLA105B                        | FLA305A                        | FLA605B                        |
|----------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Part Number                      | 100-258-716                    | 100-637-668                    | 100-532-788                    |
| Grip Type                        | Nut & Bolt                     | Nut & Bolt                     | Nut & Bolt                     |
| Force Capacity                   | 100 kN (22,480 lbf)            | 300 kN (67,440 lbf)            | 600 kN (134,885 lbf)           |
| Upper Grip Weight                | 4.1 kg (9.0 lb)                | 20 kg (44.1 lb)                | 16.9 kg (37.3 lb)              |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| Attachment Type                  | D                              | E                              | 38 mm post                     |
| Combined Upper/Lower Grip Height | 314 mm (12.3 in)               | 516 mm (20.3 in)               | 540 mm (21.2 in)               |
| Grip Width                       | 134 mm (5.3 in)                | 187 mm (7.4 in)                | 205 mm (8 in)                  |

# Tension Grips

## Manual Activation

### MTS Fundamental Roller Grips

- » Affordable roller grips designed for quick loading and self-tightening
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Wound up specimen clamping prevents stress concentration and damage outside of test range
- » Clamping force may be increased by winding the specimen around the movable part of the grip
- » Grips are sold in pairs
- » Specimen interface ("drum") is integrated with each grip
- » **Applications:** Tensile tests of bandages, textiles, synthetics, and flexible polymers



FMR503



CB504E



FCA105C

### Specifications

| Model                                   | FMR503                          | CB504E                         | FCA105C                            |
|-----------------------------------------|---------------------------------|--------------------------------|------------------------------------|
| <b>Part Number</b>                      | 100-033-790                     | 100-302-702                    | 100-257-526                        |
| <b>Grip Type</b>                        | Manual Roller                   | Manual Roller                  | Manual Roller                      |
| <b>Force Capacity</b>                   | 5 kN (1,125 lbf)                | 50 kN (11,250 lbf)             | 100 kN (22,000 lbf)                |
| <b>Upper Grip Weight</b>                | 0.74 kg (1.6 lbs)               | 8.34 kg (18.4 lb)              | 8.34 kg (18.4 lb)                  |
| <b>Temperature Range</b>                | -15° C (5° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | -50° C (-58° F) to 150° C (302° F) |
| <b>Attachment Type</b>                  | D                               | 40                             | D                                  |
| <b>Combined Upper/Lower Grip Height</b> | 266 mm (10.5 in)                | 410 mm (16.1 in)               | 534 mm (21 in)                     |
| <b>Grip Width</b>                       | 89 mm (3.5 in)                  | 182 mm (7.2 in)                | 138 mm (5.4 in)                    |

### Integrated Specimen Interface

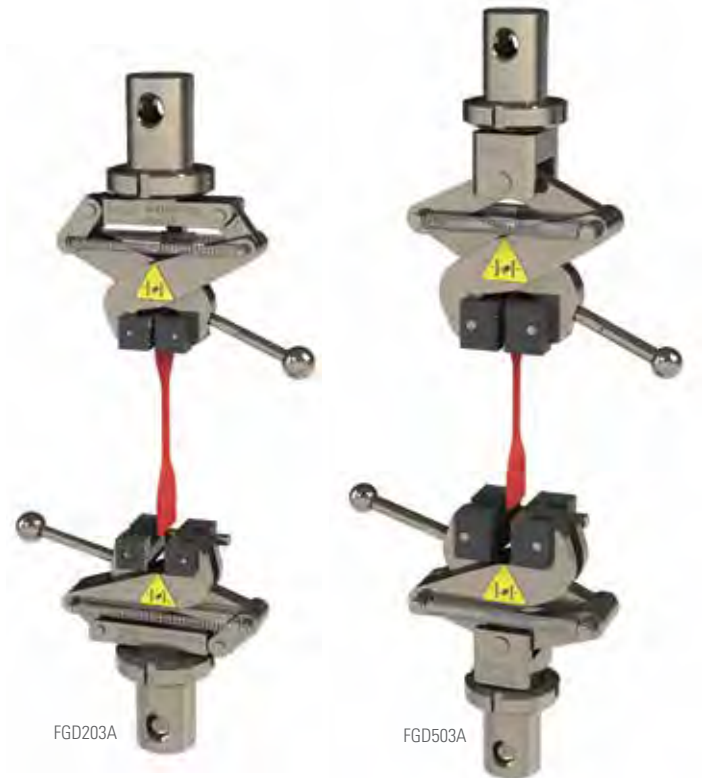
| Profile               | Self-Tightening Full-Round |       | Self-Tightening Half-Round | Self-Tightening Full-Round |
|-----------------------|----------------------------|-------|----------------------------|----------------------------|
| <b>Surface</b>        | Diamond                    | Steel | Smooth Steel               | Smooth Steel               |
| <b>Minimum Length</b> | 400 mm (15.7 in)           |       | 650 mm (25.6 in)           | 650 mm (25.6 in)           |
| <b>Specimen Range</b> | 0-7.5 mm (0-0.3 in)        |       | 0-4 mm (0-0.2 in)          | 0-5 mm (0-0.2 in)          |
| <b>Maximum Width</b>  | 30 mm (1.2 in)             |       | 100 mm (3.9 in)            | 85 mm (3.3 in)             |

# Tension Grips

Manual Activation

## MTS Fundamental Scissor Grips

- » Affordable scissor grips that feature self-tightening, self-aligning clamps
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of delicate flat, flexible specimens like foil, films, rubber, and flexible polymers



## Specifications

| Model                            | FGD203A                        | FGD503A                        |
|----------------------------------|--------------------------------|--------------------------------|
| Part Number                      | 100-231-401                    | 100-231-402                    |
| Grip Type                        | Manual Scissors                | Manual Scissors                |
| Force Capacity                   | 2 kN (450 lbf)                 | 5 kN (1,124 lbf)               |
| Upper Grip Weight                | 1.01 kg (2.2 lb)               | 1.74 kg (3.8 lb)               |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| Attachment Type                  | D                              | D                              |
| Combined Upper/Lower Grip Height | 298 mm (11.7 in)               | 346 mm (13.6 in)               |
| Grip Width                       | 164 mm (6.5 in)                | 194 mm (7.6 in)                |

## Integrated Specimen Interface

| Profile        | Flat               | Flat               |
|----------------|--------------------|--------------------|
| Surface        | Sawtooth Steel     | Sawtooth Steel     |
| Height         | 16 mm (0.6 in)     | 25 mm (1.0 in)     |
| Width          | 30 mm (1.2 in)     | 40 mm (1.6 in)     |
| Specimen Range | 0-12 mm (0-0.5 in) | 0-14 mm (0-0.6 in) |

# Tension Grips

Manual Activation

## MTS Advantage Screw Grips

- » High-performance, versatile screw grips with approximately twice the clamp force of comparably rated pneumatic grips
- » Dual-acting grip faces ensure correct specimen alignment and eliminate bending strains
- » Alignment guide assures concentricity
- » Faces pivot for self-alignment and reduced likelihood of breakage at the specimen face contact
- » Quick and easy interchangeable faces are compatible with MTS pneumatic grips
- » Flexible mounting allows adapters to be easily changed
- » Accommodates threaded configurations
- » Knurled screw for hand tightening of specimen during installation
- » Low profile grip body increases test space, provides room to hold flexible specimens above and below the faces
- » Side-loading design suitable for use in environmental chambers
- » Can be used in a fixed (one side follows through) and non-fixed (both sides follow through) configuration
- » Interchangeable, resilient pucks to allow follow through action, to compensate for specimen neck-down, minimize damage to delicate specimens, and increase clamp load for difficult specimens
- » Temperature range of -129°C to 200°C (-200°F to 400°F) when using the aluminum version of the pucks described above.
- » Grips are sold in pairs
- » All specimen interfaces(“faces”) are sold separately
- » **Applications:** Tensile testing of metals, plastics, polymers, and wood with ability to test lap shear specimens
- » *See pages 37-39 for wedge options*



## Specifications

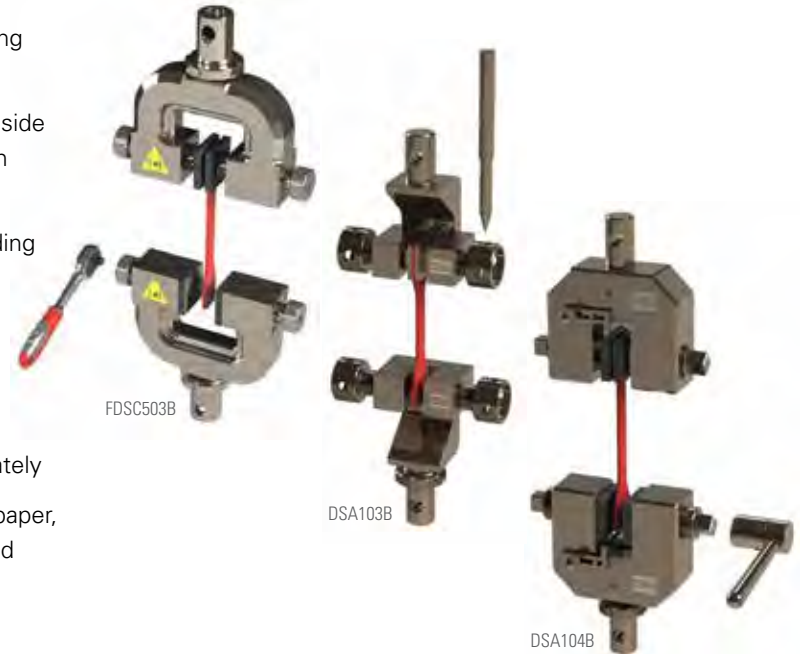
| Model                                   | ASG102                             | ASG203                             | ASG503                             | ASG104                             |
|-----------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <b>Part Number</b>                      | 055-426-701                        | 055-426-801                        | 055-426-901                        | 100-030-185                        |
| <b>Grip Type</b>                        | Manual Screw                       | Manual Screw                       | Manual Screw                       | Manual Screw                       |
| <b>Force Capacity</b>                   | 0.01 kN (2.25 lbf)                 | 0.2 kN (45 lbf)                    | 2 kN (450 lbf)                     | 10 kN (2,250 lbf)                  |
| <b>Upper Grip Weight</b>                | 0.27 kg (0.6 lb)                   | 1 kg (2.2 lb)                      | 3.2 kg (7.0 lb)                    | 6.8 kg (15.0 lb)                   |
| <b>Temperature Rating</b>               | -40° C (-40° F) to 200° C (400° F) | -40° C (-40° F) to 200° C (400° F) | -40° C (-40° F) to 200° C (400° F) | -40° C (-40° F) to 200° C (400° F) |
| <b>Attachment Type</b>                  | C                                  | D                                  | D                                  | D                                  |
| <b>Combined Upper/Lower Grip Height</b> | 236 mm (9.3 in)                    | 294 mm (11.6 in)                   | 350 mm (13.8 in)                   | 352 mm (13.9 in)                   |
| <b>Grip Width</b>                       | 130 mm (5.1 in)                    | 164 mm (6.5 in)                    | 211 mm (8.3 in)                    | 210.6 mm (8.29 in)                 |

# Tension Grips

## Manual Activation

### MTS Fundamental Screw Grips

- » Affordable screw grips that deliver higher clamping forces than vise grips
- » Improved applications performance with manual side face adjustment and adjustable clamping position inside the grip
- » Quick-acting U-shaped grips allow specimen loading from the side for better test performance
- » Centering device provides fast and accurate specimen center force axis positioning
- » Grips are sold in pairs
- » All specimen interfaces ("faces") are sold separately
- » **Applications:** Tensile testing of stronger, larger paper, plastic plate and film, textiles, sheet materials and packaging specimens



### Specifications

| Model                                   | FDSC503B                       | DSA103B                        | DSA104B                        |
|-----------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-238-152                    | 100-302-669                    | 100-302-671                    |
| <b>Grip Type</b>                        | Manual Screw                   | Manual Screw                   | Manual Screw                   |
| <b>Force Capacity</b>                   | 1 kN (225 lbf)                 | 1 kN (225 lbf)                 | 10 kN (2,250 lbf)              |
| <b>Upper Grip Weight</b>                | 2.36 kg (5.2 lb)               | 0.08 kg (1.8 lb)               | 1.90 kg (4.2 lb)               |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | D                              | 20                             | 20                             |
| <b>Combined Upper/Lower Grip Height</b> | 298 mm (11.7 in)               | 201 mm (7.9 in)                | 234 mm (9.2 in)                |
| <b>Grip Width</b>                       | 172 mm (6.8 in)                | 106 mm (4.2 in)                | 123 mm (4.8 in)                |

### FDSC503B Optional Specimen Interfaces

| Model              | Part Number | Profile | Surface        | Height         | Width          | Temperature Range              | Specimen Range     |
|--------------------|-------------|---------|----------------|----------------|----------------|--------------------------------|--------------------|
| <b>FDSC503B.01</b> | 100-238-153 | Flat    | Sawtooth Steel | 36 mm (1.4 in) | 36 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | 0-16 mm (0-0.6 in) |
| <b>FDSC503B.02</b> | 100-238-164 | Flat    | Rubber         | 36 mm (1.4 in) | 36 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | 0-16 mm (0-0.6 in) |

### DSA103B Optional Specimen Interfaces

| Model              | Part Number | Profile | Surface        | Height         | Width        | Temperature Range              | Specimen Range     |
|--------------------|-------------|---------|----------------|----------------|--------------|--------------------------------|--------------------|
| <b>DSA103B-02</b>  | 100-311-702 | Flat    | Smooth Steel   | 24 mm (0.9 in) | 26 mm (1 in) | 0° C (32° F) to 50° C (122° F) | 0-12 mm (0-0.5 in) |
| <b>DSA103B-02A</b> | 100-311-703 | Flat    | Sawtooth Steel | 24 mm (0.9 in) | 26 mm (1 in) | 0° C (32° F) to 50° C (122° F) | 0-12 mm (0-0.5 in) |

### DSA104B Optional Specimen Interfaces

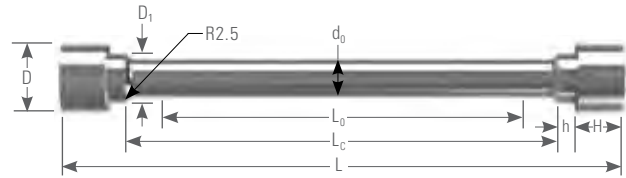
| Model                | Part Number | Profile | Surface               | Height         | Width          | Temperature Range              | Specimen Range     |
|----------------------|-------------|---------|-----------------------|----------------|----------------|--------------------------------|--------------------|
| <b>DSA104B-09/11</b> | 100-311-704 | Flat    | Sawtooth Steel        | 30 mm (1.1 in) | 34 mm (1.3 in) | 0° C (32° F) to 50° C (122° F) | 0-14 mm (0-0.6 in) |
| <b>DSA104B-10</b>    | 100-311-705 | Flat    | Corrugated (R8) Steel | 70 mm (2.7 in) | 32 mm (1.2 in) | 0° C (32° F) to 50° C (122° F) | 0-13 mm (0-0.5 in) |
| <b>DSA104B-12</b>    | 100-311-706 | Flat    | Corrugated (R5) Steel | 70 mm (2.7 in) | 32 mm (1.2 in) | 0° C (32° F) to 50° C (122° F) | 0-12 mm (0-0.5 in) |

# Tension Grips

## Manual Activation

### MTS Fundamental Shoulder Grips

- » Affordable high force grips for shoulder-ended metal parts
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » All specimen interfaces (inserts) are sold separately
- » **Applications:** Tensile tests metal materials where the sample rests on a shoulder ledge



FTA105B



Example of Optional Interface

### Specifications

| Model                            | FTA105B                        | FTA305B                        |
|----------------------------------|--------------------------------|--------------------------------|
| Part Number                      | 100-258-715                    | 100-296-160                    |
| Grip Type                        | Shoulder                       | Shoulder                       |
| Force Capacity                   | 100 kN (22,480 lbf)            | 300 kN (67,440 lbf)            |
| Upper Grip Weight                | 4.5kg (9.9 lb)                 | 26.0 kg (57.3 lb)              |
| Temperature Rating               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| Attachment Type                  | D                              | E                              |
| Combined Upper/Lower Grip Height | 330 mm (13 in)                 | 526 mm (20.7 in)               |
| Grip Width                       | 146 mm (5.7 in)                | 219 mm (8.6 in)                |

### Specimen Size

| Shoulder   | d <sub>0</sub>   | D <sub>1</sub>   | D                | h                 | H                | L <sub>0</sub>   | L <sub>c</sub>   | L                 |
|------------|------------------|------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|
| FTA105B.01 | 3 mm (0.118 in)  | 4 mm (0.157 in)  | 6 mm (0.236 in)  | 6 mm (0.236 in)   | 5 mm (0.197 in)  | 50 mm (1.969 in) | 53 mm (2.087 in) | 78 mm (3.071 in)  |
| FTA105B.02 | 5 mm (0.197 in)  | 7 mm (0.276 in)  | 12 mm (0.472 in) | 6.5 mm (0.256 in) | 8 mm (0.315 in)  | 50 mm (1.969 in) | 55 mm (2.165 in) | 88 mm (3.465 in)  |
| FTA105B.03 | 6 mm (0.236 in)  | 8 mm (0.315 in)  | 13 mm (0.512 in) | 7 mm (0.276 in)   | 10 mm (0.394 in) | 50 mm (1.969 in) | 56 mm (2.205 in) | 94 mm (3.701 in)  |
| FTA105B.04 | 8 mm (0.315 in)  | 10 mm (0.394 in) | 15 mm (0.591 in) | 8 mm (0.315 in)   | 10 mm (0.394 in) | 50 mm (1.969 in) | 58 mm (2.283 in) | 98 mm (3.858 in)  |
| FTA105B.05 | 10 mm (0.394 in) | 13 mm (0.512 in) | 18 mm (0.709 in) | 12 mm (0.472 in)  | 12 mm (0.472 in) | 50 mm (1.969 in) | 60 mm (2.362 in) | 113 mm (4.449 in) |

| Shoulder   | d <sub>0</sub>     | D <sub>1</sub>   | D                | h                | H                | L <sub>0</sub>    | L <sub>c</sub>    | L                  |
|------------|--------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|--------------------|
| FTA305B.01 | 10 mm (0.394 in)   | 13 mm (0.512 in) | 18 mm (0.709 in) | 14 mm (0.551 in) | 12 mm (0.472 in) | 50 mm (1.969 in)  | 60 mm (2.362 in)  | 113 mm (4.449 in)  |
| FTA305B.02 | 12.5 mm (0.492 in) | 16 mm (0.827 in) | 22 mm (0.866 in) | 20 mm (0.787 in) | 15 mm (0.591 in) | 60 mm (2.362 in)  | 78 mm (3.071 in)  | 148 mm (5.827 in)  |
| FTA305B.03 | 16 mm (0.630 in)   | 21 mm (0.827 in) | 28 mm (1.102 in) | 30 mm (1.181 in) | 19 mm (0.748 in) | 80 mm (3.150 in)  | 96 mm (3.779 in)  | 194 mm (7.638 in)  |
| FTA305B.04 | 20 mm (0.787 in)   | 26 mm (1.024 in) | 35 mm (1.378 in) | 46 mm (1.811 in) | 24 mm (0.945 in) | 100 mm (3.937 in) | 120 mm (4.724 in) | 260 mm (10.236 in) |
| FTA305B.05 | 25 mm (0.984 in)   | 32 mm (1.260 in) | 45 mm (1.772 in) | 48 mm (1.890 in) | 30 mm (1.181 in) | 125 mm (4.921 in) | 150 mm (5.906 in) | 306 mm (12.047 in) |

### FTA105B Optional Specimen Interfaces

| Model      | Part Number | Profile  | Temperature Range              | Specimen Range | Compatible Grip Model |
|------------|-------------|----------|--------------------------------|----------------|-----------------------|
| FTA105B.01 | 100-258-729 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø3 mm          | FTA105B               |
| FTA105B.02 | 100-258-730 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø5 mm          | FTA105B               |
| FTA105B.03 | 100-258-731 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø6 mm          | FTA105B               |
| FTA105B.04 | 100-258-732 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø8 mm          | FTA105B               |
| FTA105B.05 | 100-258-733 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø10 mm         | FTA105B               |

### FTA305B Optional Specimen Interfaces

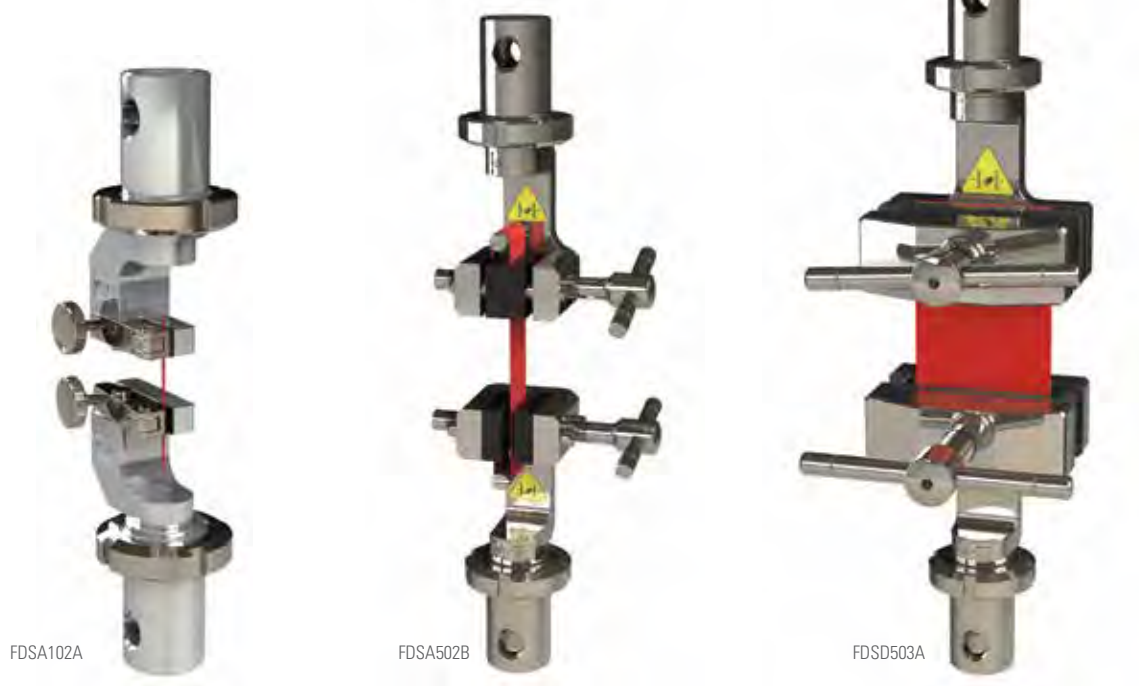
|            |             |          |                                |          |         |
|------------|-------------|----------|--------------------------------|----------|---------|
| FTA305B.01 | 100-339-726 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø10 mm   | FTA305B |
| FTA305B.02 | 100-296-161 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø12.5 mm | FTA305B |
| FTA305B.03 | 100-339-727 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø16 mm   | FTA305B |
| FTA305B.04 | 100-339-728 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø20 mm   | FTA305B |
| FTA305B.05 | 100-339-729 | Shoulder | 0° C (32° F) to 50° C (122° F) | ø25 mm   | FTA305B |

## Tension Grips

### Manual Activation

#### MTS Fundamental Vise Grips

- » Affordable vise grips
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of paper, plastic film, textiles, sheet materials and packaging components



#### Specifications

| Model                                   | FDSA102A                       | FDSA502B                       | FDSD503A                       |
|-----------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-231-832                    | 100-231-833                    | 100-231-400                    |
| <b>Grip Type</b>                        | Manual Vise                    | Manual Vise                    | Manual Vise                    |
| <b>Force Capacity</b>                   | 0.1 kN (22 lbf)                | 0.5 kN (112 lbf)               | 5 kN (1,124 lbf)               |
| <b>Upper Grip Weight</b>                | 0.31 kg (0.7 lb)               | 1.0 kg (2.2 lb)                | 2.01 kg (4.4 lb)               |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | D                              | D                              | D                              |
| <b>Combined Upper/Lower Grip Height</b> | 216 mm (8.5 in)                | 270 mm (10.6 in)               | 290 mm (11.4 in)               |
| <b>Grip Width</b>                       | 71.5 mm (2.8 in)               | 111 mm (4.4 in)                | 120 mm (4.7 in)                |

#### Integrated Specimen Interface

|                       |                      |                   |                    |
|-----------------------|----------------------|-------------------|--------------------|
| <b>Profile</b>        | Flat                 | Flat              | Corrugated         |
| <b>Surface</b>        | Rubber               | Rubber            | Steel              |
| <b>Height</b>         | 10 mm (0.4 in)       | 25 mm (1.0 in)    | 35 mm (1.4 in)     |
| <b>Width</b>          | 10 mm (0.4 in)       | 35 mm (1.4 in)    | 65 mm (2.5 in)     |
| <b>Specimen Range</b> | 0-1.5 mm (0-0.04 in) | 0-6 mm (0-0.2 in) | 0-7 mm (0-0.03 in) |

## Tension Grips

### Manual Activation

#### MTS Fundamental Vise Grips

- » Affordable vise grips for lower force testing needs
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » Specimen interface ("face") is integrated with each grip
- » **Applications:** Tensile testing of paper, plastic film, textiles, sheet materials and packaging components



#### Specifications

| Model                                   | FMV101                           | FMV102                               | BTV102                               |
|-----------------------------------------|----------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                      | 100-033-784                      | 100-033-242                          | 100-167-987                          |
| <b>Grip Type</b>                        | Manual Vise                      | Manual Vise                          | Stainless Steel Manual Vise          |
| <b>Force Capacity</b>                   | 0.01 kN (2.25 lbf)               | 0.1 kN (22.5 lbf)                    | 0.1 kN (22.5 lbf)                    |
| <b>Upper Grip Weight</b>                | 0.07 kg (0.15 lbs)               | 0.11 kg (0.25 lbs)                   | 0.14 kg (0.3 lbs)                    |
| <b>Temperature Rating</b>               | -20° C (-4° F) to 70° C (158° F) | -130° C (-202° F) to 177° C (350° F) | -130° C (-202° F) to 250° C (482° F) |
| <b>Attachment Type</b>                  | B                                | C                                    | C                                    |
| <b>Combined Upper/Lower Grip Height</b> | 158 mm (6.2 in)                  | 161 mm (6.3 in)                      | 161 mm (6.3 in)                      |
| <b>Grip Width</b>                       | 36 mm (1.4 in)                   | 36 mm (1.4 in)                       | 36 mm (1.4 in)                       |

#### Integrated Specimen Interface

| Profile               | Flat                 | Flat               | Flat               |
|-----------------------|----------------------|--------------------|--------------------|
| <b>Surface</b>        | Sawtooth Steel       | Sawtooth Steel     | Sawtooth Steel     |
| <b>Specimen Range</b> | 0-3.5 mm (0-0.14 in) | 0-3 mm (0-0.12 in) | 0-3 mm (0-0.12 in) |
| <b>Maximum Width</b>  | 20 mm (0.79 in)      | 14 mm (0.55 in)    | 14 mm (0.55 in)    |

#### MTS Fundamental Vise Grip

- » Affordable vise grips for wide specimen testing
- » Specimen reference line enables better specimen positioning
- » Grips are sold in pairs
- » Specimen interface ("face") is integrated with each grip
- » **Applications:** Tensile testing of wide specimens including paper, plastic film, and textile materials



#### Specifications

| Model                                   | DSA204B                        |
|-----------------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-302-673                    |
| <b>Grip Type</b>                        | Manual Vise                    |
| <b>Force Capacity</b>                   | 20 kN (4,500 lbf)              |
| <b>Upper Grip Weight</b>                | 15.61 kg (34.4 lb)             |
| <b>Temperature Range</b>                | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | 20                             |
| <b>Combined Upper/Lower Grip Height</b> | 313 mm (12.3 in)               |
| <b>Grip Width</b>                       | 210 mm (8.3 in)                |

#### Integrated Specimen Interface

| Profile               | Flat               |
|-----------------------|--------------------|
| <b>Surface</b>        | Corrugated Steel   |
| <b>Height</b>         | 50 mm (1.9 in)     |
| <b>Width</b>          | 210 mm (8.3 in)    |
| <b>Specimen Range</b> | 0-10 mm (0-0.4 in) |

# Tension Grips

Manual Activation

## MTS Fundamental Vise Grips

- » Affordable vise grips for higher force testing needs
- » Switching structure allows faces to be moved synchronously or separately
- » Quick-acting U-shaped grips allow specimen loading from the side for better test performance
- » Centering device provides fast and accurate specimen center force axis positioning
- » Grips are sold in pairs
- » All specimen interfaces (“faces”) are sold separately
- » **Applications:** Tensile testing of paper, plastic film, textiles, sheet materials and packaging components



## Specifications

| Model                                   | DX104A                         | DX105A                         |
|-----------------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-302-665                    | 100-302-666                    |
| <b>Grip Type</b>                        | Manual Vise                    | Manual Vise                    |
| <b>Force Capacity</b>                   | 10 kN (2,250 lbf)              | 100 kN (22,000 lbf)            |
| <b>Upper Grip Weight</b>                | 9.80 kg (21.6 lb)              | 62 kg (136.7 lb)               |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | 20                             | 40                             |
| <b>Combined Upper/Lower Grip Height</b> | 327 mm (12.9 in)               | 458 mm (18 in)                 |
| <b>Grip Width</b>                       | 250 mm (9.8 in)                | 352 mm (13.9 in)               |

## DX104A Optional Specimen Interfaces

| Model             | Part Number | Profile | Surface                    | Height         | Width          | Temperature Range              | Specimen Range         |
|-------------------|-------------|---------|----------------------------|----------------|----------------|--------------------------------|------------------------|
| <b>DX104A-07</b>  | 100-302-880 | Flat    | Sawtooth Steel             | 54 mm (2.1 in) | 40 mm (1.6 in) | 0° C (32° F) to 50° C (122° F) | 0-20 mm (0-0.8 in)     |
| <b>DX104A-07a</b> | 100-311-711 | Flat    | Smooth Steel w/SiC coating | 54 mm (2.1 in) | 40 mm (1.6 in) | 0° C (32° F) to 50° C (122° F) | 0-20 mm (0-0.8 in)     |
| <b>DX104A-23</b>  | 100-302-881 | Vee     | Serrated Steel             | 54 mm (2.1 in) | 40 mm (1.6 in) | 0° C (32° F) to 50° C (122° F) | ø4-ø9 mm (0.2-0.4 in)  |
| <b>DX104A-24</b>  | 100-302-882 | Vee     | Serrated Steel             | 54 mm (2.1 in) | 40 mm (1.6 in) | 0° C (32° F) to 50° C (122° F) | ø9-ø14 mm (0.4-0.6 in) |

## DX105A Optional Specimen Interfaces

|                  |             |      |                |                |                |                                |                           |
|------------------|-------------|------|----------------|----------------|----------------|--------------------------------|---------------------------|
| <b>DX105A-18</b> | 100-302-884 | Flat | Sawtooth Steel | 70 mm (2.8 in) | 60 mm (2.4 in) | 0° C (32° F) to 50° C (122° F) | 0-20 mm (0-0.55 in)       |
| <b>DX105A-19</b> | 100-302-885 | Vee  | Serrated Steel | 70 mm (2.8 in) | 60 mm (2.4 in) | 0° C (32° F) to 50° C (122° F) | ø14-19 mm (ø0.55-0.75 in) |

# Tension Grips

## Manual Activation

### MTS Advantage Wedge Grips

- » High-performance, versatile wedge grips with higher clamping force than screw or pneumatic grips
- » Faces remain stationary during loading to minimize compressive or buckling forces during specimen insertion
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Available with interchangeable faces for serrated wedges for round or flat specimens
- » Self-tightening during testing reduces slippage
- » Grips are sold in pairs
- » All specimen interfaces ("wedges") are sold separately
- » **Applications:** Tensile testing of metals, composites, ceramics, plastics and wood/paper products
- » *See page 34 for wedge options*



### Specifications

| Model                                   | AWG104                               | AWG304                               | AWG504                               | AWG105                               | AWG305                               |
|-----------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                      | 056-079-501                          | 052-862-001                          | 054-951-001                          | 056-079-801                          | 100-270-777                          |
| <b>Grip Type</b>                        | Manual Wedge                         | Manual Wedge                         | Manual Wedge                         | Manual Wedge                         | Manual Wedge                         |
| <b>Force Capacity</b>                   | 10 kN (2,250 lbf)                    | 30 kN (6,740 lbf)                    | 50 kN (11,240 lbf)                   | 100 kN (22,480 lbf)                  | 300 kN (67,440 lbf)                  |
| <b>Upper Grip Weight</b>                | 4.6 kg (10.0 lb)                     | 5 kg (11 lb)                         | 6.4 kg (14 lb)                       | 13.6 kg (30 lb)                      | 53.5 kg (118 lb)                     |
| <b>Temperature Rating</b>               | -130° C (-200° F) to 315° C (600° F) | -130° C (-200° F) to 315° C (600° F) | -130° C (-200° F) to 315° C (600° F) | -130° C (-200° F) to 315° C (600° F) | -130° C (-200° F) to 315° C (600° F) |
| <b>Attachment Type</b>                  | D                                    | D                                    | D                                    | D                                    | E                                    |
| <b>Combined Upper/Lower Grip Height</b> | 432 mm (17 in)                       | 494 mm (19.5 in)                     | 504 mm (19.8 in)                     | 528 mm (20.8 in)                     | 686 mm (27 in)                       |
| <b>Grip Width</b>                       | 197 mm (7.8 in)                      | 197 mm (7.8 in)                      | 206 mm (8.1 in)                      | 243 mm ( in)                         | 407 mm (16.0 in)                     |

# Tension Grips

## Manual Activation

### MTS Fundamental Wedge Grips

- » Affordable wedge grips for higher force testing needs
- » Design minimizes compressive or buckling forces during specimen insertion
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Grips are sold in pairs
- » All specimen interfaces (“wedges”) are sold separately
- » **Applications:** Tensile testing of strong plastics, aluminum and steel
- » *See page 35 for wedge options*



### Specifications

| Model                                   | FXSA104B                       | FXSA304B                       | FXSA105A                       | FXSA305A                       |
|-----------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                      | 100-257-698                    | 100-231-404                    | 100-231-405                    | 100-257-525                    |
| <b>Grip Type</b>                        | Manual Wedge                   | Manual Wedge                   | Manual Wedge                   | Manual Wedge                   |
| <b>Force Capacity</b>                   | 10 kN (2,250 lbf)              | 30 kN (6,740 lbf)              | 100 kN (22,480 lbf)            | 300 kN (67,440 lbf)            |
| <b>Upper Grip Weight</b>                | 3.10 kg (6.8 lb)               | 9.19 kg (20.3 lb)              | 14.79 kg (32.6 lb)             | 26.0 kg (57.3 lb)              |
| <b>Temperature Rating</b>               | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                  | D                              | D                              | D                              | E                              |
| <b>Combined Upper/Lower Grip Height</b> | 344 mm (13.5 in)               | 538 mm (21.2 in)               | 626 mm (24.6 in)               | 688 mm (27.1 in)               |
| <b>Grip Width</b>                       | 104 mm (4.09 in)               | 370 mm (14.567 in)             | 370 mm (14.567 in)             | 385 mm (15.2 in)               |

## Tension Wedges

### Model 647.02B Grip & MTS Advantage APG104 Grip Optional Wedges

| Model             | Part Number | Profile           | Surface           | Height         | Width          | Temperature Range                    | Specimen Range                                            | Compatible Grip(s) |
|-------------------|-------------|-------------------|-------------------|----------------|----------------|--------------------------------------|-----------------------------------------------------------|--------------------|
| <b>647.02B.01</b> | 050-507-901 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 13.4-20.5 mm (0.53-0.81 in)                               | 647.02B            |
| <b>647.02B.02</b> | 050-507-904 | Flat              | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 13.4-20.5 mm (0.53-0.81 in)                               | 647.02B            |
| <b>647.02B.03</b> | 050-507-905 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 18.8-25.9 mm (0.74-1.02 in)                               | APG104, 647.02B    |
| <b>647.02B.04</b> | 050-507-906 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 0-7.2 mm (0-0.28 in)                                      | APG104, 647.02B    |
| <b>647.02B.05</b> | 050-507-907 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 7.2-14.4 mm (0.28-0.57 in)                                | APG104, 647.02B    |
| <b>647.02B.06</b> | 050-507-908 | Vee               | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø3-8.1 mm (0.12-0.32 in) Side, ø9.4 mm (0.37 in) Top      | APG104, 647.02B    |
| <b>647.02B.07</b> | 050-507-909 | Vee               | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø8.9-10.9 mm (0.35-0.43 in) Side, ø15.2 mm (0.60 in) Top  | APG104, 647.02B    |
| <b>647.02B.08</b> | 050-507-910 | Vee               | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø14-18 mm (0.55-0.71 in) Side, ø20.8 mm (0.82 in) Top     | APG104, 647.02B    |
| <b>647.02B.09</b> | 050-507-911 | Vee               | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø20.1-22.9 mm (0.79-0.90 in) Side, ø27.2 mm (1.07 in) Top | APG104, 647.02B    |
| <b>647.02B.10</b> | 050-507-912 | Round             | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø10.0 mm (0.3937 in)                                      | 647.02B            |
| <b>647.02B.11</b> | 050-507-913 | Round             | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø15.0 mm (0.5906 in)                                      | APG104, 647.02B    |
| <b>647.02B.12</b> | 050-507-914 | Round             | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | Ø25.0 mm (0.9843 in)                                      | 647.02B            |
| <b>647.02B.13</b> | 050-507-915 | Round             | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | ø12.7 mm (0.5000 in)                                      | APG104, 647.02B    |
| <b>647.02B.14</b> | 050-507-917 | Flat              | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 0-7.2 mm (0-0.28 in)                                      | APG104, 647.02B    |
| <b>647.02B.15</b> | 050-507-918 | Flat              | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 177° C (350° F)   | 7.2-14.4 mm (0.28-0.57 in)                                | 647.02B            |
| <b>647.02B.16</b> | 054-585-001 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 50 mm (2.0 in) | -40° C (-40° F) to 177° C (350° F)   | 0-7.1 mm (0-0.28 in)                                      | APG104, 647.02B    |
| <b>647.02B.17</b> | 054-585-002 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 50 mm (2.0 in) | -40° C (-40° F) to 177° C (350° F)   | 7.1-13.4 mm (0.28-0.57 in)                                | APG104, 647.02B    |
| <b>647.02B.18</b> | 054-585-003 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 50 mm (2.0 in) | -40° C (-40° F) to 177° C (350° F)   | 13.5-20.5 mm (0.53-0.81 in)                               | APG104, 647.02B    |
| <b>647.02B.19</b> | 054-585-004 | Flat              | Sawtooth Steel    | 38 mm (1.5 in) | 50 mm (2.0 in) | -40° C (-40° F) to 177° C (350° F)   | 16.9-24.0 mm (0.66-0.95 in)                               | APG104, 647.02B    |
| <b>647.02B.20</b> | 052-818-701 | Flat–water cooled | Diamond Tip Steel | 38 mm (1.5 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.1 mm (0-0.28 in)                                      | APG104, 647.02B    |
| <b>647.02B.21</b> | 052-818-702 | Flat–water cooled | Surfallooy        | 38 mm (1.5 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.1 mm (0-0.28 in)                                      | APG104, 647.02B    |

## Tension Wedges

### Model 647.10A Grip Optional Wedges

| Model             | Part Number | Profile | Surface           | Height         | Width             | Temperature Range                  | Specimen Range                                           | Compatible Grip(s) |
|-------------------|-------------|---------|-------------------|----------------|-------------------|------------------------------------|----------------------------------------------------------|--------------------|
| <b>647.10A.01</b> | 041-842-101 | Flat    | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 0-7.6 mm (0-0.3 in)                                      | 647.10A            |
| <b>647.10A.02</b> | 041-842-102 | Flat    | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |
| <b>647.10A.03</b> | 041-842-103 | Vee     | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø5.8-10.2 mm (0.23-0.4 in) Side, ø11.9 mm (0.47 in) Top  | 647.10A            |
| <b>647.10A.04</b> | 041-842-104 | Vee     | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø10.9-12.7 mm (0.43-0.5 in) Side, ø16.5 mm (0.65 in) Top | 647.10A            |
| <b>647.10A.05</b> | 041-842-107 | Vee     | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø12.7-19.1 mm (0.5-0.75 in) Side & Top                   | 647.10A            |
| <b>647.10A.06</b> | 041-842-108 | Flat    | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 0-7.9 mm (0-0.31 in)                                     | 647.10A            |
| <b>647.10A.07</b> | 041-842-109 | Flat    | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 11.7-19.1 mm (0.46-0.75 in)                              | 647.10A            |
| <b>647.10A.08</b> | 041-842-110 | Vee     | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø17-22.9 mm (0.67-0.9 in) Side & Top                     | 647.10A            |
| <b>647.10A.09</b> | 041-842-111 | Flat    | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |
| <b>647.10A.10</b> | 041-842-121 | Flat    | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | 11.7-19.1 mm (0.46-0.75 in)                              | 647.10A            |
| <b>647.10A.11</b> | 041-842-132 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø12.7 mm (0.5000 in)                                     | 647.10A            |
| <b>647.10A.12</b> | 041-842-133 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø19.0 mm (0.7500 in)                                     | 647.10A            |
| <b>647.10A.13</b> | 041-842-134 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø12.0 mm (0.4724 in)                                     | 647.10A            |
| <b>647.10A.14</b> | 041-842-135 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø15.0 mm (0.5906 in)                                     | 647.10A            |
| <b>647.10A.15</b> | 041-842-136 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø20.0 mm (0.7874 in)                                     | 647.10A            |
| <b>647.10A.16</b> | 041-842-149 | Round   | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -40° C (-40° F) to 177° C (350° F) | ø25.4 mm (1.0000 in)                                     | 647.10A            |
| <b>647.10A.17</b> | 046-198-601 | Flat    | Surf alloy        | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |
| <b>647.10A.18</b> | 046-198-602 | Flat    | Surf alloy        | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F) | 0-7.6 mm (0-0.3 in)                                      | 647.10A            |
| <b>647.10A.19</b> | 046-198-603 | Flat    | Diamond Tip Steel | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |

(continued next page...)

## Tension Wedges

Model 647.10A Grip Optional Wedges (continued)

| Model             | Part Number | Profile            | Surface           | Height         | Width             | Temperature Range                    | Specimen Range                                           | Compatible Grip(s) |
|-------------------|-------------|--------------------|-------------------|----------------|-------------------|--------------------------------------|----------------------------------------------------------|--------------------|
| <b>647.10A.20</b> | 046-198-604 | Flat               | Diamond Tip Steel | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F)   | 0-7.6 mm (0-0.3 in)                                      | 647.10A            |
| <b>647.10A.21</b> | 046-198-606 | Flat               | Diamond Tip Steel | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F)   | 17-25.4 mm (0.67-1.0 in)                                 | 647.10A            |
| <b>647.10A.22</b> | 046-198-610 | Flat               | Diamond Tip Steel | 63 mm (2.5 in) | 76 mm x (3.0 in)  | -40° C (-40° F) to 177° C (350° F)   | 11.4-18.9 mm (0.45-0.75 in)                              | 647.10A            |
| <b>647.10A.23</b> | 046-838-701 | Flat–water cooled  | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |
| <b>647.10A.24</b> | 046-838-702 | Flat–water cooled  | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.6 mm (0-0.3 in)                                      | 647.10A            |
| <b>647.10A.25</b> | 046-838-703 | Vee–water cooled   | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø5.8-10.2 mm (0.23-0.4 in) Side, ø11.9 mm (0.47 in) Top  | 647.10A            |
| <b>647.10A.26</b> | 046-838-704 | Vee–water cooled   | Serrated Steel    | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø10.9-12.7 mm (0.43-0.5 in) Side, ø16.5 mm (0.65 in) Top | 647.10A            |
| <b>647.10A.27</b> | 046-838-705 | Flat–water cooled  | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.6 mm (0-0.3 in)                                      | 647.10A            |
| <b>647.10A.28</b> | 046-838-706 | Flat–water cooled  | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | 7.1-14.2 mm (0.28-0.56 in)                               | 647.10A            |
| <b>647.10A.29</b> | 046-838-713 | Flat–water cooled  | Diamond Tip Steel | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | 11.7-19.1 mm (0.46-0.75 in)                              | 647.10A            |
| <b>647.10A.30</b> | 046-838-714 | Round–water cooled | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø12.7 mm (0.5000 in)                                     | 647.10A            |
| <b>647.10A.31</b> | 046-838-716 | Round–water cooled | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø12.0 mm (0.4724 in)                                     | 647.10A            |
| <b>647.10A.32</b> | 046-838-717 | Round–water cooled | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø15.0 mm (0.5906 in)                                     | 647.10A            |
| <b>647.10A.33</b> | 046-838-718 | Round–water cooled | Surf alloy        | 63 mm (2.5 in) | 44 mm x (1.75 in) | -130° C (-200° F) to 315° C (600° F) | ø20.0 mm (0.7874 in)                                     | 647.10A            |

## Tension Wedges

### Model 647.25A Grip Optional Wedges

| Model             | Part Number | Profile | Surface           | Height         | Width             | Temperature Range                  | Specimen Range                          | Compatible Grip(s) |
|-------------------|-------------|---------|-------------------|----------------|-------------------|------------------------------------|-----------------------------------------|--------------------|
| <b>647.25A.01</b> | 041-842-201 | Flat    | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.02</b> | 041-842-202 | Flat    | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |
| <b>647.25A.03</b> | 041-842-203 | Flat    | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |
| <b>647.25A.04</b> | 041-842-204 | Vee     | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø10.7-19.8 mm (0.42-0.78 in) Side & Top | 647.25A            |
| <b>647.25A.05</b> | 041-842-205 | Vee     | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø16.8-26.2 mm (0.66-1.03 in) Side & Top | 647.25A            |
| <b>647.25A.06</b> | 041-842-206 | Vee     | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø6.4-13.5 mm (0.25-0.53 in) Side & Top  | 647.25A            |
| <b>647.25A.07</b> | 041-842-207 | Flat    | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.08</b> | 041-842-208 | Flat    | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |
| <b>647.25A.09</b> | 041-842-209 | Flat    | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |
| <b>647.25A.10</b> | 041-842-231 | Round   | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø15.0 mm (0.5906 in)                    | 647.25A            |
| <b>647.25A.11</b> | 041-842-232 | Round   | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø20.0 mm (0.7874 in)                    | 647.25A            |
| <b>647.25A.12</b> | 041-842-233 | Round   | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø30.0 mm (1.1811 in)                    | 647.25A            |
| <b>647.25A.13</b> | 041-842-234 | Round   | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø12.7 mm (0.5000 in)                    | 647.25A            |
| <b>647.25A.14</b> | 041-842-235 | Round   | Surf alloy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø25.4 mm (1.0000 in)                    | 647.25A            |
| <b>647.25A.15</b> | 046-198-801 | Flat    | Surf alloy        | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 0-10.1 mm (0-0.40 in)                   | 647.25A            |
| <b>647.25A.16</b> | 046-198-802 | Flat    | Surf alloy        | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |
| <b>647.25A.17</b> | 046-198-803 | Flat    | Surf alloy        | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |
| <b>647.25A.18</b> | 046-198-804 | Flat    | Diamond Tip Steel | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.19</b> | 046-198-805 | Flat    | Diamond Tip Steel | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |

(continued next page...)

## Tension Wedges

Model 647.25A Grip Optional Wedges (continued)

| Model             | Part Number | Profile           | Surface           | Height         | Width             | Temperature Range                    | Specimen Range                          | Compatible Grip(s) |
|-------------------|-------------|-------------------|-------------------|----------------|-------------------|--------------------------------------|-----------------------------------------|--------------------|
| <b>647.25A.20</b> | 046-198-806 | Flat              | Diamond Tip Steel | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F)   | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |
| <b>647.25A.21</b> | 046-198-817 | Flat              | Surfallooy        | 89 mm (3.5 in) | 102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F)   | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.22</b> | 045-966-201 | Flat—water cooled | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.23</b> | 045-966-202 | Flat—water cooled | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |
| <b>647.25A.24</b> | 045-966-203 | Vee—water cooled  | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | ø16.8-26.2 mm (0.66-1.03 in) Side & Top | 647.25A            |
| <b>647.25A.25</b> | 045-966-204 | Flat—water cooled | Diamond Tip Steel | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |
| <b>647.25A.26</b> | 045-966-205 | Flat—water cooled | Surfallooy        | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.27</b> | 045-966-206 | Vee—water cooled  | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | ø6.4-13.5 mm (0.25-0.53 in) Side & Top  | 647.25A            |
| <b>647.25A.28</b> | 045-966-207 | Vee—water cooled  | Serrated Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | ø10.7-19.8 mm (0.42-0.78 in) Side & Top | 647.25A            |
| <b>647.25A.29</b> | 045-966-208 | Flat—water cooled | Sawtooth Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 1-11.9 mm (0.04-0.47 in)                | 647.25A            |
| <b>647.25A.30</b> | 045-966-209 | Flat—water cooled | Sawtooth Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 6.1-17 mm (0.24-0.67 in)                | 647.25A            |
| <b>647.25A.31</b> | 045-966-210 | Flat—water cooled | Sawtooth Steel    | 89 mm (3.5 in) | 50 mm x (2.0 in)  | -130° C (-200° F) to 315° C (600° F) | 15-25.9 mm (0.59-1.02 in)               | 647.25A            |

## Tension Wedges

### Model 647.50A Grip Optional Wedges

| Model             | Part Number | Profile | Surface           | Height          | Width              | Temperature Range                  | Specimen Range                          | Compatible Grip(s) |
|-------------------|-------------|---------|-------------------|-----------------|--------------------|------------------------------------|-----------------------------------------|--------------------|
| <b>647.50A.01</b> | 047-641-601 | Vee     | Serrated Steel    | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø6.4-15.5 mm (0.25-0.61 in) Side & Top  | 647.50A            |
| <b>647.50A.02</b> | 047-641-602 | Vee     | Serrated Steel    | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø15.2-24.4 mm (0.60-0.96 in) Side & Top | 647.50A            |
| <b>647.50A.03</b> | 047-641-603 | Vee     | Serrated Steel    | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø24.1-33.5 mm (0.95-1.32 in) Side & Top | 647.50A            |
| <b>647.50A.04</b> | 047-641-604 | Vee     | Serrated Steel    | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø33-42.4 mm (1.30-1.67 in) Side & Top   | 647.50A            |
| <b>647.50A.05</b> | 047-641-605 | Vee     | Serrated Steel    | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | ø41.9-51.3 mm (1.65-2.02 in) Side & Top | 647.50A            |
| <b>647.50A.06</b> | 047-641-606 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 0-10.9 mm (0-0.43 in)                   | 647.50A            |
| <b>647.50A.07</b> | 047-641-607 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 10.2-21.1 mm (0.40-0.83 in)             | 647.50A            |
| <b>647.50A.08</b> | 047-641-608 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 1102 mm x (4.0 in) | -40° C (-40° F) to 177° C (350° F) | 20.3-31.2 mm (0.80-1.23 in)             | 647.50A            |
| <b>647.50A.09</b> | 047-641-609 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 30.5-41.4 mm (1.20-1.63 in)             | 647.50A            |
| <b>647.50A.10</b> | 047-641-610 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 40.6-51.6 mm (1.60-2.03 in)             | 647.50A            |
| <b>647.50A.11</b> | 047-641-611 | Flat    | Surfallooy        | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 0-10.9 mm (0-0.43 in)                   | 647.50A            |
| <b>647.50A.12</b> | 047-641-612 | Flat    | Surfallooy        | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 10.2-21.1 mm (0.40-0.83 in)             | 647.50A            |
| <b>647.50A.13</b> | 047-641-613 | Flat    | Surfallooy        | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 20.3-31.2 mm (0.80-1.23 in)             | 647.50A            |
| <b>647.50A.14</b> | 048-966-301 | Flat    | Surfallooy        | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 20.3-31.2 mm (0.80-1.23 in)             | 647.50A            |
| <b>647.50A.15</b> | 048-966-303 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 10.2-21.1 mm (0.40-0.83 in)             | 647.50A            |
| <b>647.50A.16</b> | 048-966-304 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 20.3-31.2 mm (0.80-1.23 in)             | 647.50A            |
| <b>647.50A.17</b> | 048-966-305 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 30.5-41.4 mm (1.20-1.63 in)             | 647.50A            |
| <b>647.50A.18</b> | 048-966-306 | Flat    | Diamond Tip Steel | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 40.6-51.6 mm (1.60-2.03 in)             | 647.50A            |
| <b>647.50A.19</b> | 048-966-307 | Flat    | Surfallooy        | 95 mm (3.75 in) | 102 mm x (4.0 in)  | -40° C (-40° F) to 177° C (350° F) | 0-10.9 mm (0-0.43 in)                   | 647.50A            |

## Tension Wedges

### AWG104, AWG304 & AWG504 Grip Optional Wedges

| Model            | Part Number | Profile | Surface        | Height         | Width          | Temperature Range                    | Specimen Range                                             | Compatible Grip(s)         |
|------------------|-------------|---------|----------------|----------------|----------------|--------------------------------------|------------------------------------------------------------|----------------------------|
| <b>AWG504.01</b> | 053-140-801 | Flat    | Sawtooth Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.9 mm (0-0.31 in)                                       | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.02</b> | 053-140-802 | Flat    | Sawtooth Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | 6-13.2 mm (0.23-0.52 in)                                   | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.03</b> | 053-140-803 | Vee     | Serrated Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | ø3-7.9 mm (0.12-0.31 in) Side,<br>ø7.9 mm (0.31 in) Top    | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.04</b> | 053-140-804 | Vee     | Serrated Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | ø7-9.5 mm (0.27-0.38 in) Side,<br>ø12.7 mm (0.50 in) Top   | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.05</b> | 053-140-805 | Vee     | Serrated Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | ø11.5-12.7 mm (0.45-0.50 in) Side,<br>ø16 mm (0.63 in) Top | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.06</b> | 053-140-806 | Flat    | Surf alloy     | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-7.9 mm (0-0.31 in)                                       | AWG104<br>AWG304<br>AWG504 |
| <b>AWG504.07</b> | 053-140-807 | Vee     | Serrated Steel | 50 mm (2.0 in) | 25 mm (1.0 in) | -130° C (-200° F) to 315° C (600° F) | ø1.5-5 mm (0.06-0.20 in) Side,<br>ø5 mm (0.20 in) Top      | AWG104<br>AWG304<br>AWG504 |

### AWG105 & AWG305 Grip Optional Wedges

| Model            | Part Number | Profile | Surface        | Height           | Width          | Temperature Range                    | Specimen Range                                               | Compatible Grip(s) |
|------------------|-------------|---------|----------------|------------------|----------------|--------------------------------------|--------------------------------------------------------------|--------------------|
| <b>AWG305.01</b> | 053-537-401 | Flat    | Sawtooth Steel | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-9 mm (0-0.35 in)                                           | AWG105<br>AWG305   |
| <b>AWG305.02</b> | 053-537-402 | Flat    | Sawtooth Steel | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | 6.4-16 mm (0.25-0.63 in)                                     | AWG105<br>AWG305   |
| <b>AWG305.03</b> | 053-537-403 | Vee     | Serrated Steel | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | ø5-10.4 mm (0.20-0.41 in) Side,<br>ø12.5 mm (0.49 in) Top    | AWG105<br>AWG305   |
| <b>AWG305.04</b> | 053-537-404 | Vee     | Serrated Steel | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | ø12.2-16.5 mm (0.48-0.61 in) Side,<br>ø19.5 mm (0.77 in) Top | AWG105<br>AWG305   |
| <b>AWG305.05</b> | 053-537-405 | Vee     | Serrated Steel | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | ø3.2-5.8 mm (0.12-0.23 in) Side,<br>ø7.6 mm (0.30 in) Top    | AWG105<br>AWG305   |
| <b>AWG305.06</b> | 053-537-406 | Flat    | Surf alloy     | 70 mm (2.75 in)  | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | 0-9 mm (0-0.35 in)                                           | AWG105<br>AWG305   |
| <b>AWG305.07</b> | 053-537-407 | Round   | Surf alloy     | 770 mm (2.75 in) | 50 mm (2.0 in) | -130° C (-200° F) to 315° C (600° F) | ø12.70 mm (0.5000 in)                                        | AWG105<br>AWG305   |

## Tension Wedges

### FXSA104B Grip Optional Wedges

| Model                  | Part Number | Profile | Surface        | Height         | Width          | Temperature Range              | Specimen Range             | Compatible Grip Model |
|------------------------|-------------|---------|----------------|----------------|----------------|--------------------------------|----------------------------|-----------------------|
| <b>FXSA104B.01 x 2</b> | 100-258-168 | Flat    | Sawtooth Steel | 40 mm (1.6 in) | 35 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | 0-7 mm (0-0.28 in)         | FXSA104B              |
| <b>FXSA104B.02 x 2</b> | 100-258-169 | Flat    | Sawtooth Steel | 40 mm (1.6 in) | 35 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | 7-13 mm (0.28-0.51 in)     | FXSA104B              |
| <b>FXSA104B.03 x 2</b> | 100-258-170 | Vee     | Serrated Steel | 40 mm (1.6 in) | 35 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | ø4-ø9 mm (ø0.16-ø0.35 in)  | FXSA104B              |
| <b>FXSA104B.04 x 2</b> | 100-258-171 | Vee     | Serrated Steel | 40 mm (1.6 in) | 35 mm (1.4 in) | 0° C (32° F) to 50° C (122° F) | ø9-ø14 mm (ø0.35-ø0.55 in) | FXSA104B              |

### FXSA105A Grip Optional Wedges

|                    |             |      |                |                |                 |                                |                             |                      |
|--------------------|-------------|------|----------------|----------------|-----------------|--------------------------------|-----------------------------|----------------------|
| <b>FXSA105A.01</b> | 100-231-648 | Flat | Sawtooth Steel | 55 mm (2.2 in) | 40 mm (1.6 in)  | 0° C (32° F) to 50° C (122° F) | 0-7 mm (0-0.28 in)          | FXSA304A<br>FXSA105A |
| <b>FXSA105A.02</b> | 100-231-649 | Flat | Sawtooth Steel | 55 mm (2.2 in) | 40 mm (1.6 in)  | 0° C (32° F) to 50° C (122° F) | 7-14 mm (0.28-0.55 in)      | FXSA304A<br>FXSA105A |
| <b>FXSA105A.03</b> | 100-231-650 | Flat | Sawtooth Steel | 55 mm (2.2 in) | 40 mm (1.6 in)  | 0° C (32° F) to 50° C (122° F) | 14-21 mm (0.55-0.83 in)     | FXSA304A<br>FXSA105A |
| <b>FXSA105A.04</b> | 100-231-651 | Vee  | Serrated Steel | 55 mm (2.2 in) | 40 mm (1.6 in)  | 0° C (32° F) to 50° C (122° F) | ø4-ø9 mm (ø0.16-ø0.35 in)   | FXSA304A<br>FXSA105A |
| <b>FXSA105A.05</b> | 100-231-652 | Vee  | Serrated Steel | 55 mm (2.2 in) | 40 mm (1.6 in)  | 0° C (32° F) to 50° C (122° F) | ø9-ø14 mm (ø0.35-ø0.55 in)  | FXSA304A<br>FXSA105A |
| <b>FXSA105A.06</b> | 100-231-653 | Vee  | Serrated Steel | 55 mm (2.2 in) | 440 mm (1.6 in) | 0° C (32° F) to 50° C (122° F) | ø14-ø19 mm (ø0.55-ø0.75 in) | FXSA304A<br>FXSA105A |

### FXSA305A Grip Optional Wedges

|                        |             |      |                |                |                |                                |                             |          |
|------------------------|-------------|------|----------------|----------------|----------------|--------------------------------|-----------------------------|----------|
| <b>FXSA305A.01 x 2</b> | 100-258-160 | Flat | Sawtooth Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | 0-8 mm (0-0.32 in)          | FXSA305A |
| <b>FXSA305A.02 x 2</b> | 100-258-161 | Flat | Sawtooth Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | 8-16 mm (0.32-0.63 in)      | FXSA305A |
| <b>FXSA305A.03 x 2</b> | 100-258-162 | Flat | Sawtooth Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | 16-24 mm (0.63-0.95 in)     | FXSA305A |
| <b>FXSA305A.04 x 2</b> | 100-258-163 | Flat | Sawtooth Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | 24-32 mm (0.95-1.26 in)     | FXSA305A |
| <b>FXSA305A.05 x 2</b> | 100-258-164 | Vee  | Serrated Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | ø4-ø9 mm (ø0.16-ø0.35 in)   | FXSA305A |
| <b>FXSA305A.06 x 2</b> | 100-258-165 | Vee  | Serrated Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | ø9-ø16 mm (ø0.35-ø0.63 in)  | FXSA305A |
| <b>FXSA305A.07 x 2</b> | 100-258-166 | Vee  | Serrated Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | ø16-ø23 mm (ø0.63-ø0.91 in) | FXSA305A |
| <b>FXSA305A.08 x 2</b> | 100-258-167 | Vee  | Serrated Steel | 62 mm (2.4 in) | 50 mm (2.0 in) | 0° C (32° F) to 50° C (122° F) | ø23-ø30 mm (ø0.91-ø1.18 in) | FXSA305A |

## Tension Faces

### FYD305 Grip Optional Faces

| Model            | Part Number | Profile | Surface        | Height         | Width           | Temperature Range              | Specimen Range                      | Compatible Grip(s) |
|------------------|-------------|---------|----------------|----------------|-----------------|--------------------------------|-------------------------------------|--------------------|
| <b>FYD305.01</b> | 100-465-487 | Flat    | Sawtooth Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | 0-6 mm (0-0.23 in)                  | FYD305             |
| <b>FYD305.02</b> | 100-465-488 | Flat    | Sawtooth Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | 6-18 mm (0.23-0.7 in)               | FYD305             |
| <b>FYD305.03</b> | 100-465-489 | Flat    | Sawtooth Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | 18-30 mm (0.7-1.18 in)              | FYD305             |
| <b>FYD305.04</b> | 100-465-484 | Vee     | Serrated Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø6-16 mm (0.23-0.63 in) Side & Top  | FYD305             |
| <b>FYD305.05</b> | 100-465-485 | Vee     | Serrated Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø16-26 mm (0.63-1.02 in) Side & Top | FYD305             |
| <b>FYD305.06</b> | 100-465-486 | Vee     | Serrated Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø26-36 mm (1.02-1.41 in) Side & Top | FYD305             |
| <b>FYD305.07</b> | 100-465-490 | Vee     | Rebar          | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø6-16 mm (0.23-0.63 in)             | FYD305             |
| <b>FYD305.08</b> | 100-465-491 | Vee     | Rebar          | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø16-26 mm (0.63-1.02 in)            | FYD305             |
| <b>FYD305.09</b> | 100-465-492 | Vee     | Rebar          | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | Ø26-36 mm (1.02-1.42 in)            | FYD305             |
| <b>FYD305.10</b> | 100-629-970 | Flat    | Sawtooth Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | 30-36 mm (1.18-1.42 in)             | FYD305             |
| <b>FYD305.11</b> | 100-629-971 | Flat    | Sawtooth Steel | 68 mm (2.7 in) | 70 mm (2.75 in) | 0° C (32° F) to 50° C (122° F) | 36-40 mm (1.42-1.57 in)             | FYD305             |

### FYD605 Grip Optional Faces

|                  |             |      |                |                |                |                                |                          |        |
|------------------|-------------|------|----------------|----------------|----------------|--------------------------------|--------------------------|--------|
| <b>FYD605.01</b> | 100-490-363 | Flat | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | 0-6 mm (0-0.23 in)       | FYD605 |
| <b>FYD605.02</b> | 100-490-364 | Flat | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | 6-23 mm (0.23-0.9 in)    | FYD605 |
| <b>FYD605.03</b> | 100-490-365 | Flat | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | 23-40 mm (0.9-1.57 in)   | FYD605 |
| <b>FYD605.04</b> | 100-490-366 | Vee  | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø6-12 mm (0.23-0.47 in)  | FYD605 |
| <b>FYD605.05</b> | 100-490-367 | Vee  | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø12-27 mm (0.47-1.06 in) | FYD605 |
| <b>FYD605.06</b> | 100-490-368 | Vee  | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø27-42 mm (1.06-1.65 in) | FYD605 |
| <b>FYD605.07</b> | 100-490-369 | Vee  | Rebar          | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø6-12 mm (0.23-0.47 in)  | FYD605 |
| <b>FYD605.08</b> | 100-490-370 | Vee  | Rebar          | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø12-27 mm (0.47-1.06 in) | FYD605 |
| <b>FYD605.09</b> | 100-490-371 | Vee  | Rebar          | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø27-42 mm (1.06-1.65 in) | FYD605 |
| <b>FYD605.10</b> | 100-504-191 | Vee  | Sawtooth Steel | 83 mm (3.3 in) | 90 mm (3.5 in) | 0° C (32° F) to 50° C (122° F) | Ø4-6 mm (0.15-0.23 in)   | FYD605 |

## Tension Faces

### APG101 Grip Optional Faces

| Model            | Part Number | Profile | Surface        | Height        | Width          | Temperature Range                  | Specimen Range    | Compatible Grip Model |
|------------------|-------------|---------|----------------|---------------|----------------|------------------------------------|-------------------|-----------------------|
| <b>APG101.01</b> | 056-163-701 | Flat    | Smooth Steel   | 8 mm (0.3 in) | 15 mm (0.6 in) | -40° C (-40° F) to 200° C (400° F) | 0-5 mm (0-0.2 in) | APG101                |
| <b>APG101.02</b> | 056-163-702 | Flat    | Serrated Steel | 8 mm (0.3 in) | 15 mm (0.6 in) | -40° C (-40° F) to 200° C (400° F) | 0-5 mm (0-0.2 in) | APG101                |
| <b>APG101.03</b> | 056-163-703 | Flat    | Smooth Rubber  | 8 mm (0.3 in) | 15 mm (0.6 in) | -40° C (-40° F) to 200° C (400° F) | 0-5 mm (0-0.2 in) | APG101                |

### APG202 & APG203 and ASG102 & ASG203 Grip Optional Faces

| Model            | Part Number | Profile | Surface                                   | Height         | Width          | Temperature Range                  | Specimen Range                                                                                                           | Compatible Grip Model                |
|------------------|-------------|---------|-------------------------------------------|----------------|----------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>APG203.01</b> | 056-163-801 | Flat    | Smooth Steel                              | 25 mm (1.0 in) | 25 mm (1.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.02</b> | 056-163-802 | Flat    | Corrugated Rubber                         | 25 mm (1.0 in) | 25 mm (1.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.03</b> | 056-163-803 | Flat    | Serrated Steel                            | 25 mm (1.0 in) | 25 mm (1.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.04</b> | 056-163-804 | Flat    | Diamond Tip Steel                         | 25 mm (1.0 in) | 25 mm (1.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.05</b> | 056-163-805 | Flat    | Matte Rubber                              | 25 mm (1.0 in) | 25 mm (1.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.06</b> | 056-163-806 | Flat    | Corrugated Rubber                         | 25 mm (1.0 in) | 25 mm (1.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.07</b> | 056-163-807 | Flat    | Smooth Rubber                             | 25 mm (1.0 in) | 25 mm (1.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.08</b> | 056-163-808 | Flat    | Line Contact steel<br>R4.75 mm (0.187 in) | 13 mm (0.5 in) | 25 mm (1.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.09</b> | 056-163-809 | Flat    | Smooth Steel                              | 25 mm (1.0 in) | 75 mm (3.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.10</b> | 056-163-810 | Flat    | Corrugated Steel                          | 25 mm (1.0 in) | 75 mm (3.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |

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## Tension Faces

APG202 & APG203 and ASG102 & ASG203 Grip Optional Faces (continued)

| Model            | Part Number | Profile | Surface                               | Height         | Width          | Temperature Range                  | Specimen Range                                                                                                           | Compatible Grip Model                |
|------------------|-------------|---------|---------------------------------------|----------------|----------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>APG203.11</b> | 056-163-811 | Flat    | Serrated Steel                        | 25 mm (1.0 in) | 75 mm (3.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.12</b> | 056-163-812 | Flat    | Diamond Tip Steel                     | 25 mm (1.0 in) | 75 mm (3.0 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.13</b> | 056-163-813 | Flat    | Matte Rubber                          | 25 mm (1.0 in) | 75 mm (3.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.14</b> | 056-163-814 | Flat    | Corrugated Rubber                     | 25 mm (1.0 in) | 75 mm (3.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.15</b> | 056-163-815 | Flat    | Smooth Rubber                         | 25 mm (1.0 in) | 75 mm (3.0 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.16</b> | 056-163-816 | Flat    | Smooth Steel                          | 38 mm (1.5 in) | 58 mm (2.3 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.17</b> | 056-163-817 | Flat    | Corrugated Steel                      | 38 mm (1.5 in) | 58 mm (2.3 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.18</b> | 056-163-818 | Flat    | Serrated Steel                        | 38 mm (1.5 in) | 58 mm (2.3 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.19</b> | 056-163-819 | Flat    | Diamond Tip Steel                     | 38 mm (1.5 in) | 58 mm (2.3 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.20</b> | 056-163-820 | Flat    | Matte Rubber                          | 38 mm (1.5 in) | 58 mm (2.3 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.21</b> | 056-163-821 | Flat    | Corrugated Rubber                     | 38 mm (1.5 in) | 58 mm (2.3 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.22</b> | 056-163-822 | Flat    | Smooth Rubber                         | 38 mm (1.5 in) | 58 mm (2.3 in) | 0° C (32° F) to 50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.23</b> | 056-163-823 | Flat    | Line contact steel R4.75mm (0.187 in) | 13 mm (0.5 in) | 58 mm (2.3 in) | -40° C (-40° F) to 200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |

(continued next page...)

## Tension Faces

### APG202 & APG203 and ASG102 & ASG203 Grip Optional Faces (continued)

| Model            | Part Number | Profile | Surface                                                 | Height                                           | Width                                            | Temperature Range                     | Specimen Range                                                                                                           | Compatible Grip Model                |
|------------------|-------------|---------|---------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>APG203.24</b> | 056-163-824 | Flat    | Grab Test Steel                                         | 38 mm (1.5 in),<br>contact area<br>25mm (1.0 in) | 58 mm (2.3 in),<br>contact area<br>38mm (1.5 in) | -40° C (-40° F) to<br>200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.25</b> | 056-163-825 | Flat    | Smooth Rubber                                           | 12 mm<br>(0.5 in)                                | 25 mm<br>(1.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)<br>ASG102: 0-12 mm (0-0.47 in)<br>ASG203: 0-19 mm (0-0.75 in) | APG202<br>APG203<br>ASG102<br>ASG203 |
| <b>APG203.26</b> | 056-163-826 | Flat    | Smooth rubber/<br>line contact<br>R4.75mm<br>(0.187 in) | 25 mm<br>(1.0 in)                                | 25 mm<br>(1.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |
| <b>APG203.27</b> | 056-163-827 | Flat    | Smooth rubber/<br>line contact<br>R4.75mm<br>(0.187 in) | 38 mm<br>(1.5 in)                                | 58 mm<br>(2.3 in)                                | 0° C (32° F) to<br>50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |
| <b>APG203.28</b> | 056-163-828 | Flat    | Diamond Tip Steel                                       | 25 mm<br>(1.0 in)                                | 150 mm<br>(5.9 in)                               | -40° C (-40° F) to<br>200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |
| <b>APG203.29</b> | 056-163-829 | Flat    | Smooth rubber/<br>line contact<br>R2.5mm<br>(0.098 in)  | 25 mm<br>(1.0 in)                                | 25 mm<br>(1.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |
| <b>APG203.30</b> | 056-163-830 | Flat    | Smooth Rubber                                           | 25 mm<br>(1.0 in)                                | 150 mm<br>(5.9 in)                               | 0° C (32° F) to<br>50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |
| <b>APG203.31</b> | 056-163-832 | Flat    | Smooth Rubber                                           | 25 mm<br>(1.0 in)                                | 100 mm<br>(3.9 in)                               | 0° C (32° F) to<br>50° C (122° F)     | APG202: 0-10 mm (0-0.39 in)<br>APG203: 0-12 mm (0-0.47 in)                                                               | APG202<br>APG203                     |

### ASG503 & ASG104 Grip Optional Faces

| Model            | Part Number | Profile | Surface                                            | Height                                           | Width                                            | Temperature Range                     | Specimen Range        | Compatible Grip(s) |
|------------------|-------------|---------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|---------------------------------------|-----------------------|--------------------|
| <b>ASG104.01</b> | 056-163-901 | Flat    | Smooth Steel                                       | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503             |
| <b>ASG104.02</b> | 056-163-902 | Flat    | Corrugated Steel                                   | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.03</b> | 056-163-903 | Flat    | Serrated Steel                                     | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.04</b> | 056-163-904 | Flat    | Diamond Tip Steel                                  | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.05</b> | 056-163-905 | Flat    | Matte Rubber                                       | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.06</b> | 056-163-906 | Flat    | Corrugated Rubber                                  | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.07</b> | 056-163-907 | Flat    | Smooth Rubber                                      | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.08</b> | 056-163-908 | Flat    | Line contact<br>steel R4.75mm<br>(0.187 in)        | 20 mm<br>(0.8 in)                                | 75 mm<br>(3.0 in)                                | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.09</b> | 056-163-909 | Flat    | Grab Test Steel                                    | 50 mm (2.0 in),<br>contact area<br>25mm (1.0 in) | 75 mm (3.0 in),<br>contact area<br>25mm (1.0 in) | -40° C (-40° F) to<br>200° C (400° F) | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |
| <b>ASG104.10</b> | 056-163-910 | Flat    | Line rubber/ line<br>contact R4.75mm<br>(0.187 in) | 50 mm<br>(2.0 in)                                | 75 mm<br>(3.0 in)                                | 0° C (32° F) to<br>50° C (122° F)     | 0-25 mm<br>(0-1.0 in) | ASG503<br>ASG104   |

## Tension Inserts

### FLA105B Grip Optional Inserts

| Model             | Part Number | Profile | Temperature Range              | Specimen Range | Compatible Grip Model |
|-------------------|-------------|---------|--------------------------------|----------------|-----------------------|
| <b>FLA105B.01</b> | 100-258-717 | Bolt    | 0° C (32° F) to 50° C (122° F) | M4             | FLA105B               |
| <b>FLA105B.02</b> | 100-258-718 | Bolt    | 0° C (32° F) to 50° C (122° F) | M5             | FLA105B               |
| <b>FLA105B.03</b> | 100-258-719 | Bolt    | 0° C (32° F) to 50° C (122° F) | M6             | FLA105B               |
| <b>FLA105B.04</b> | 100-258-720 | Bolt    | 0° C (32° F) to 50° C (122° F) | M8             | FLA105B               |
| <b>FLA105B.05</b> | 100-258-721 | Bolt    | 0° C (32° F) to 50° C (122° F) | M10            | FLA105B               |
| <b>FLA105B.06</b> | 100-258-722 | Bolt    | 0° C (32° F) to 50° C (122° F) | M12            | FLA105B               |
| <b>FLA105B.07</b> | 100-258-723 | Nut     | 0° C (32° F) to 50° C (122° F) | M4             | FLA105B               |
| <b>FLA105B.08</b> | 100-258-724 | Nut     | 0° C (32° F) to 50° C (122° F) | M5             | FLA105B               |
| <b>FLA105B.09</b> | 100-258-725 | Nut     | 0° C (32° F) to 50° C (122° F) | M6             | FLA105B               |
| <b>FLA105B.10</b> | 100-258-726 | Nut     | 0° C (32° F) to 50° C (122° F) | M8             | FLA105B               |
| <b>FLA105B.11</b> | 100-258-727 | Nut     | 0° C (32° F) to 50° C (122° F) | M10            | FLA105B               |
| <b>FLA105B.12</b> | 100-258-728 | Nut     | 0° C (32° F) to 50° C (122° F) | M12            | FLA105B               |

### FLA305B Grip Optional Inserts

|                   |             |         |                                |                            |         |
|-------------------|-------------|---------|--------------------------------|----------------------------|---------|
| <b>FLA305A.00</b> | 100-456-909 | Adapter | 0° C (32° F) to 50° C (122° F) | Adapter to FLA105B inserts | FLA305B |
| <b>FLA305A.01</b> | 100-456-956 | Bolt    | 0° C (32° F) to 50° C (122° F) | M12x1.75                   | FLA305A |
| <b>FLA305A.02</b> | 100-456-958 | Bolt    | 0° C (32° F) to 50° C (122° F) | M16x2                      | FLA305A |
| <b>FLA305A.03</b> | 100-456-960 | Bolt    | 0° C (32° F) to 50° C (122° F) | M20x2.5                    | FLA305A |
| <b>FLA305A.04</b> | 100-456-962 | Bolt    | 0° C (32° F) to 50° C (122° F) | M24x3                      | FLA305A |
| <b>FLA305A.05</b> | 100-456-963 | Bolt    | 0° C (32° F) to 50° C (122° F) | 1/2-13                     | FLA305A |
| <b>FLA305A.06</b> | 100-456-964 | Bolt    | 0° C (32° F) to 50° C (122° F) | 5/8-11                     | FLA305A |
| <b>FLA305A.07</b> | 100-456-965 | Bolt    | 0° C (32° F) to 50° C (122° F) | 3/4-10                     | FLA305A |

### FLA605B Grip Optional Inserts

|                   |             |      |                                |     |         |
|-------------------|-------------|------|--------------------------------|-----|---------|
| <b>FLA605B.01</b> | 100-534-774 | Bolt | 0° C (32° F) to 50° C (122° F) | M20 | FLA605B |
| <b>FLA605B.02</b> | 100-534-775 | Bolt | 0° C (32° F) to 50° C (122° F) | M22 | FLA605B |
| <b>FLA605B.03</b> | 100-534-776 | Bolt | 0° C (32° F) to 50° C (122° F) | M24 | FLA605B |
| <b>FLA605B.04</b> | 100-534-777 | Bolt | 0° C (32° F) to 50° C (122° F) | M27 | FLA605B |

## Controllers/Supply

MTS Model 685 self-contained, Hydraulic Grip Supplies have been engineered for both performance and ease of use.

### Standard Features Include:

- » Directional control valve for each grip
- » Center valve detent, allowing unparalleled control over gripping
- » Continuous positive pressure design, providing high pressure stability over the entire operating range
- » Separate flow control valve for control of grip engagement speed
- » Independent grip circuits eliminate crosstalk
- » Easy to maintain and service
- » Accommodate a wide range of electrical connections

### Model 685.10 and Model 685.22 Standalone Hydraulic Grip Supplies

The 685.22 and 685.10 units feature a self-contained hydraulic pump, a 0.75 kW (1 hp) electric motor, a 11.3 l (3 gal) reservoir, a 10-micron absolute return line filter, and hoses for connection to grips. These units are furnished with individual directional control valves for upper and lower grips. The grip supplies use a special hydraulic fluid which allows the grips to be used in environmental chambers at elevated temperatures. They are designed to run continuously, which results in good pressure stability and easy adjustment of the output pressure. Grip closure rate is also adjustable. Since the grip supplies are self-contained systems, they allow the use of hydraulic grips on non-hydraulic test systems.



## Controller/Supply

### Model 685 Hydraulic Grip Controller/Supply

- » Required for proper operation of Model 647 Hydraulic Wedge Grips
- » Provide precise upper and lower grip clamp/release control, pressure control and rate adjustment
- » Enable tight control of highly uniform and consistent clamping forces
- » Intuitive, easy-to-use control interface facilitate streamlined test setup
- » Special hydraulic fluid allows the grips to be used in environmental chambers at elevated temperatures
- » Self-contained design allows for the use of hydraulic grips on non-hydraulic test systems

### Specifications

| Model                                      | 685.10E-05                            | 685.10E-06                            | 685.10E-07                            | 685.10E-08                            |
|--------------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <b>Part Number</b>                         | 057-509-601                           | 057-509-602                           | 057-509-603                           | 057-509-604                           |
| <b>Compatible Grip Model</b>               | 647.25A, 647.50A                      | 647.25A, 647.50A                      | 647.25A, 647.50A                      | 647.25A, 647.50A                      |
| <b>Output Pressure</b>                     | 10 - 70 MPa<br>(1500 to 10,000 psi)   | 10 - 70 MPa<br>(1500 to 10,000 psi)   | 10 - 70 MPa<br>(1500 to 10,000 psi)   | 10 - 70 MPa<br>(1500 to 10,000 psi)   |
| <b>Temperature Rating<br/>(Controller)</b> | 5° C (41° F) to<br>50° C (122° F)     | 5° C (41° F) to<br>50° C (122° F)     | 5° C (41° F) to<br>50° C (122° F)     | 5° C (41° F) to<br>50° C (122° F)     |
| <b>Hydraulic Hose Diameter</b>             | 6.35 mm (0.25 in)                     | 6.35 mm (0.25 in)                     | 6.35 mm (0.25 in)                     | 6.35 mm (0.25 in)                     |
| <b>Temperature Rating<br/>(Hose)</b>       | -40° C (-40° F) to<br>177° C (350° F) | -40° C (-40° F) to<br>177° C (350° F) | -40° C (-40° F) to<br>177° C (350° F) | -40° C (-40° F) to<br>177° C (350° F) |
| <b>Input Power</b>                         | 115 V, 60 Hz<br>(single phase)        | 100-115 V, 50 Hz<br>(single phase)    | 205-230 V, 60 Hz<br>(single phase)    | 200-240 V, 50 Hz<br>(single phase)    |
| <b>Power Rating</b>                        | 0.75 kW                               | 0.75 kW                               | 0.75 kW                               | 0.75 kW                               |
| <b>Height</b>                              | 914.4 mm (36.0 in)                    | 914.4 mm (36.0 in)                    | 914.4 mm (36.0 in)                    | 914.4 mm (36.0 in)                    |
| <b>Width</b>                               | 444.5 mm (17.5 in)                    | 444.5 mm (17.5 in)                    | 444.5 mm (17.5 in)                    | 444.5 mm (17.5 in)                    |
| <b>Depth</b>                               | 431.8 mm (17.0 in)                    | 431.8 mm (17.0 in)                    | 431.8 mm (17.0 in)                    | 431.8 mm (17.0 in)                    |
| <b>Weight</b>                              | 76 kg (170 lb)                        | 76 kg (170 lb)                        | 76 kg (170 lb)                        | 76 kg (170 lb)                        |

### Specifications

| Model                                      | 685.22D-05                                               | 685.22D-06                                               | 685.22D-07                                               | 685.22D-08                                               |
|--------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| <b>Part Number</b>                         | 057-598-001                                              | 057-598-002                                              | 057-598-003                                              | 057-598-004                                              |
| <b>Compatible Grip Model</b>               | 647.02B, 647.10A,<br>FYD305, FYD605,<br>FDYA504, FDYB105 | 647.02B, 647.10A,<br>FYD305, FYD605,<br>FDYA504, FDYB105 | 647.02B, 647.10A,<br>FYD305, FYD605,<br>FDYA504, FDYB105 | 647.02B, 647.10A,<br>FYD305, FYD605,<br>FDYA504, FDYB105 |
| <b>Output Pressure</b>                     | 0.7 - 20.7 MPa<br>(100 - 3000 psi)                       | 0.7 - 20.7 MPa<br>(100 - 3000 psi)                       | 0.7 - 20.7 MPa<br>(100 - 3000 psi)                       | 0.7 - 20.7 MPa<br>(100 - 3000 psi)                       |
| <b>Temperature Rating<br/>(Controller)</b> | 5° C (41° F) to<br>50° C (122° F)                        | 5° C (41° F) to<br>50° C (122° F)                        | 5° C (41° F) to<br>50° C (122° F)                        | 5° C (41° F) to<br>50° C (122° F)                        |
| <b>Hydraulic Hose Diameter</b>             | 6.35 mm (0.25 in)                                        | 6.35 mm (0.25 in)                                        | 6.35 mm (0.25 in)                                        | 6.35 mm (0.25 in)                                        |
| <b>Temperature Rating<br/>(Hose)</b>       | -40° C (-40° F) to<br>177° C (350° F)                    | -40° C (-40° F) to<br>177° C (350° F)                    | -40° C (-40° F) to<br>177° C (350° F)                    | -40° C (-40° F) to<br>177° C (350° F)                    |
| <b>Input Power</b>                         | 115 V, 60 Hz<br>(single phase)                           | 100-115 V, 50 Hz<br>(single phase)                       | 208-230 V, 60 Hz<br>(single phase)                       | 200-240 V, 50 Hz<br>(single phase)                       |
| <b>Power Rating</b>                        | 0.75 kW                                                  | 0.75 kW                                                  | 0.75 kW                                                  | 0.75 kW                                                  |
| <b>Height</b>                              | 914.4 mm (36.0 in)                                       | 914.4 mm (36.0 in)                                       | 914.4 mm (36.0 in)                                       | 914.4 mm (36.0 in)                                       |
| <b>Width</b>                               | 444.5 mm (17.5 in)                                       | 444.5 mm (17.5 in)                                       | 444.5 mm (17.5 in)                                       | 444.5 mm (17.5 in)                                       |
| <b>Depth</b>                               | 431.8 mm (17.0 in)                                       | 431.8 mm (17.0 in)                                       | 431.8 mm (17.0 in)                                       | 431.8 mm (17.0 in)                                       |
| <b>Weight</b>                              | 76 kg (170 lb)                                           | 76 kg (170 lb)                                           | 76 kg (170 lb)                                           | 76 kg (170 lb)                                           |

## Controller/Supply

### MTS Advantage Pneumatic Grip Controller/Supply

- » Required for proper operation of MTS Advantage Pneumatic Grips.
- » Provides precise control of open/close functions, air pressure regulation and flow
- » Magnetic-mount handset or optional footswitch that makes specimen loading hassle-free



APC1850

### MTS Fundamental Pneumatic Grip Controller/Supply

- » Required for proper operation of MTS Fundamental Pneumatic Bollard and Vise Grips
- » Provides precise control of open/close functions, air pressure regulation and flow



FPC2850

### Specifications

| Model                                  | APC1850                               | FPC2850                               |
|----------------------------------------|---------------------------------------|---------------------------------------|
| <b>Part Number</b>                     | 100-393-631                           | 100-416-592                           |
| <b>Grip Actuation Type</b>             | MTS Advantage Single Action Pneumatic | MTS Fundamental Dual Action Pneumatic |
| <b>Recommended Output Pressure</b>     | 0.27 - 0.55 MPa (40 - 80 psi)         | 0.27 - 0.55 MPa (40 - 80 psi)         |
| <b>Temperature Rating (Controller)</b> | 5° C (41° F) to 40° C (104° F)        | 5° C (41° F) to 40° C (104° F)        |
| <b>Air Tubing Diameter</b>             | 6mm                                   | 6 mm                                  |
| <b>Temperature Rating (Tubing)</b>     | -170° C (-275° F) to 260° C (500° F)  | -170° C (-275° F) to 260° C (500° F)  |
| <b>Input Power</b>                     | 100-240VAC, 50/60 Hz (single phase)   | 100-240VAC, 50/60 Hz (single phase)   |
| <b>Power rating</b>                    | 5.5 W                                 | 5.5 W                                 |
| <b>Height</b>                          | 330 mm (13.0 in)                      | 330 mm (13.0 in)                      |
| <b>Width</b>                           | 127 mm (5.0 in)                       | 127 mm (5.0 in)                       |
| <b>Depth</b>                           | 210 mm (8.3 in)                       | 210 mm (8.3 in)                       |
| <b>Weight</b>                          | 7 kg (15.4 lb)                        | 7 kg (15.4 lb)                        |

### Grip Controller/Supply Options

| Model          | Part Number | Handswitch  | Footswitch  | Air Filter Assembly |
|----------------|-------------|-------------|-------------|---------------------|
| <b>APC1850</b> | 100-393-631 | 100-393-629 | 100-393-630 | 100-041-199         |
| <b>FPC2850</b> | 100-416-592 | 100-393-629 | 100-393-630 | 100-041-199         |

## Compression Platens

### Model 643 Compression Platens

- » High-performance compression platens designed for high- and low-temperature testing
- » Manufactured from case-hardened steel with hard chrome plating
- » Smooth faces with etched concentric rings enable the specimen to be centered visually for better test results
- » Spherical seat is available on upper platen for improved alignment and ensuring even pressure across the entire surface of the specimen
- » Platens are sold in pairs (upper and lower)
- » **Applications:** Compression testing of composites, elastomers, foam, packaging, plastics, wood, rock, concrete and other compressible materials



### Monotonic Applications Only (stress calculations)

| Applied Load | Minimum Specimen Diameter* | Stress Formula-<br>Stress=Force/Area or $\sigma = F/A$              |
|--------------|----------------------------|---------------------------------------------------------------------|
| 10 kN        | 4.3 mm (0.17 in)           | $\sigma = 689 \text{ MPa}$                                          |
| 50 kN        | 9.6 mm (0.38 in)           | $F = \text{Force (in Newtons)}$                                     |
| 100 kN       | 13.7 mm (0.54 in)          | $A = \text{Area of specimen at platen contact (in Meter}^2\text{)}$ |
| 300 kN       | 23.6 mm (0.93 in)          |                                                                     |
| 600 kN       | 33.3 mm (1.31 in)          |                                                                     |

\*Example of Minimum Specimen Diameter Calculation for Applied Loads

### Specifications

| Model                                     | 643.06A-01/-02                       | 643.06A-03/-04                       | 643.10A-01/-02                       | 643.10A-03/-04                       |
|-------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                        | 100-024-676                          | 100-024-675                          | 100-024-678                          | 100-024-677                          |
| <b>Platen Type</b>                        | Fixed/Spherical Steel Platen         | Fixed/Fixed Steel Platen             | Fixed/Spherical Steel Platen         | Fixed/Fixed Steel Platen             |
| <b>Force Capacity (Stress)</b>            | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                |
| <b>Upper Platen Weight</b>                | 1.45 kg (3.2 lbs)                    | 0.91 kg (2 lbs)                      | 5.22 kg (11.5 lbs)                   | 3.4 kg (7.5 lbs)                     |
| <b>Temperature Rating</b>                 | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) |
| <b>Attachment Type</b>                    | D                                    | D                                    | D                                    | D                                    |
| <b>Combined Upper/Lower Platen Height</b> | 208 mm (8.2 in)                      | 184 mm (7.2 in)                      | 271 mm (10.7 in)                     | 242 mm (9.5 in)                      |
| <b>Platen Diameter</b>                    | 63.5 mm (2.5 in)                     | 63.5 mm (2.5 in)                     | 101 mm (4 in)                        | 101 mm (4 in)                        |

### Specifications

| Model                                     | 643.15A-01/-02                       | 643.15A-03/-04                       | 643.20A-01/-02                       | 643.20A-03/-04                       | 643.30A-01/-02                       | 643.30A-03/-04                       |
|-------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                        | 100-024-680                          | 100-024-679                          | 100-215-231                          | 100-215-230                          | 100-024-682                          | 100-024-681                          |
| <b>Platen Type</b>                        | Fixed/Spherical Steel Platen         | Fixed/Fixed Steel Platen             | Fixed/Spherical Steel Platen         | Fixed/Fixed Steel Platen             | Fixed/Spherical Steel Platen         | Fixed/Fixed Steel Platen             |
| <b>Force Capacity (Stress)</b>            | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                | 689 MPa (100,000 psi)                |
| <b>Upper Platen Weight</b>                | 16.78 kg (37 lbs)                    | 8.17 kg (18 lbs)                     | 38.33 kg (84.5 lbs)                  | 17.74 kg (39.1 lbs)                  | 124.7 kg (275 lbs)                   | 59 kg (130 lbs)                      |
| <b>Temperature Rating</b>                 | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) | -129° C (-200° F) to 177° C (350° F) |
| <b>Attachment Type</b>                    | D                                    | D                                    | D                                    | D                                    | D                                    | D                                    |
| <b>Combined Upper/Lower Platen Height</b> | 307.5 mm (12.1 in)                   | 249 mm (9.8 in)                      | 355 mm (14 in)                       | 274 mm (10.8 in)                     | 450 mm (17.7 in)                     | 336 mm (13.2 in)                     |
| <b>Platen Diameter</b>                    | 152 mm (6 in)                        | 152 mm (6 in)                        | 203 mm (8 in)                        | 203 mm (8 in)                        | 304 mm (12 in)                       | 304 mm (12 in)                       |

# Compression Platens

## MTS Fundamental Steel Compression Platens

- » Affordable steel compression platens designed for accurate testing with medium to higher force load cells
- » Precision-ground, hardened surfaces enhance platen durability
- » Specimen centering grooves, anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Platens are sold in pairs (upper and lower)
- » **Applications:** Compression testing of elastomers, foams, packaging, plastics, wood, and other compressible materials



FYA204A



FYB204A



FYA105A



FYC105A



FYB305A



FYC305A



## Specifications

| Model                                                      | FYA204A                            | FYB204A                            | FYA105A                            | FYC105A                            | FYB305A                            | FYC305A                            |
|------------------------------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <b>Part Number</b>                                         | 100-231-407                        | 100-231-411                        | 100-231-406                        | 100-231-413                        | 100-257-355                        | 100-257-356                        |
| <b>Platen Type</b>                                         | Fixed/Fixed Steel Platen           | Fixed/Fixed Steel Platen           | Fixed/Fixed Steel Platen           | Fixed/Fixed Steel Platen           | Fixed/Fixed Steel Platen           | Fixed/Fixed Steel Platen           |
| <b>Force Capacity</b>                                      | 20 kN (4,500 lbf)                  | 20 kN (4,500 lbf)                  | 100 kN (22,480 lbf)                | 100 kN (22,480 lbf)                | 300 kN (66,450 lbf)                | 300 kN (66,450 lbf)                |
| <b>Minimum Specimen Diameter at Maximum Force Capacity</b> | 5 mm (0.2 in)                      | 5 mm (0.2 in)                      | 5 mm (0.2 in)                      | 5 mm (0.2 in)                      | 15 mm (0.6 in)                     | 15 mm (0.6 in)                     |
| <b>Upper Platen Weight</b>                                 | 1.491 kg (3.3 lbs)                 | 3.433 kg (7.6 lbs)                 | 2.434 kg (5.4 lbs)                 | 6.637 kg (14.6 lbs)                | 8.9 kg (19.6 lbs)                  | 12 kg (26.5 lbs)                   |
| <b>Temperature Rating</b>                                  | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) |
| <b>Attachment Type</b>                                     | D                                  | D                                  | D                                  | D                                  | E                                  | E                                  |
| <b>Combined Upper/Lower Platen Height</b>                  | 156 mm (6.1 in)                    | 192 mm (7.6 in)                    | 202 mm (8 in)                      | 202 mm (8 in)                      | 320 mm (12.6 in)                   | 320 mm (12.6 in)                   |
| <b>Platen Diameter</b>                                     | 100 mm (3.9 in)                    | 150 mm (5.9 in)                    | 100 mm (3.9 in)                    | 200 mm (7.9 in)                    | 150 mm (5.9 in)                    | 200 mm (7.9 in)                    |

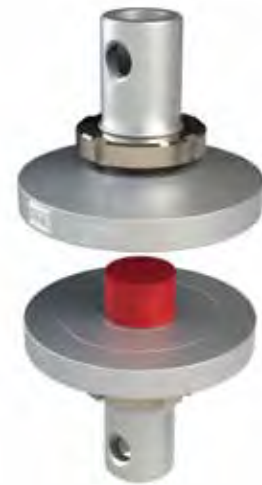
## Compression Platens

### MTS Fundamental Aluminum Compression Platens

- » Affordable lightweight aluminum compression platens designed for accurate testing with lower force load cells
- » Specimen centering grooves, anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Platens are sold in pairs (upper and lower)
- » **Applications:** Compression testing of elastomers, foams, sintered materials and components, plastics, wood, and other highly compressible materials



FYA502A



FYB502A

### Specifications

| Model                                                      | FYA502A                            | FYB502A                            |
|------------------------------------------------------------|------------------------------------|------------------------------------|
| <b>Part Number</b>                                         | 100-231-408                        | 100-231-412                        |
| <b>Platen Type</b>                                         | Fixed/Fixed Aluminum Platen        | Fixed/Fixed Aluminum Platen        |
| <b>Force Capacity</b>                                      | 0.5 kN (112 lbf)                   | 0.5 kN (112 lbf)                   |
| <b>Minimum Specimen Diameter at Maximum Force Capacity</b> | 5 mm (0.2 in)                      | 5 mm (0.2 in)                      |
| <b>Upper Platen Weight</b>                                 | 0.28 kg (0.6 lbs)                  | 0.548 kg (1.2 lbs)                 |
| <b>Temperature Range</b>                                   | -50° C (-58° F) to 100° C (212° F) | -50° C (-58° F) to 100° C (212° F) |
| <b>Attachment Type</b>                                     | D                                  | D                                  |
| <b>Combined Upper/Lower Platen Height</b>                  | 156 mm (6.1 in)                    | 156 mm (6.1 in)                    |
| <b>Platen Width</b>                                        | 50 mm (2 in)                       | 100 mm (3.9 in)                    |

### MTS Fundamental Square Compression Platens

- » Affordable square compression platens
- » Durable alloy tool steel construction with reliable surface hardness
- » Easily center specimen loading with the round or cross-line scales
- » Platens are sold in pairs (upper and lower)
- » **Applications:** Compression testing of foams packaging materials, ring stiffness of pipes and other materials



DL07589.01

### Specifications

| Model                                                      | DL07589.01                     |
|------------------------------------------------------------|--------------------------------|
| <b>Part Number</b>                                         | 100-302-770                    |
| <b>Platen Type</b>                                         | Fixed/Fixed Steel Platen       |
| <b>Force Capacity</b>                                      | 200 kN (45,000 lbf)            |
| <b>Minimum Specimen Diameter at Maximum Force Capacity</b> | 22 mm (0.9 in)                 |
| <b>Upper Platen Weight</b>                                 | 60.2 kg (133 lbs)              |
| <b>Temperature Range</b>                                   | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                                     | E                              |
| <b>Combined Upper/Lower Platen Height</b>                  | 310 mm (12.2 in)               |
| <b>Platen Width</b>                                        | 450 mm (17.7 in)               |
| <b>Platen Depth</b>                                        | 450 mm (17.7 in)               |

## Bend Fixtures

### MTS Model 642 Three & Four Point Bend Fixtures

- » MTS three & four point bend fixtures feature a modular design that accommodates a variety of testing configurations
- » Flexible configurations provide either a region of constant stress or a line of maximum stress
- » Precision machined rollers are made from corrosion-resistant hardened steel
- » Easy-to-use, permanently attached scales for equal positioning of the rollers.
- » Adjustable spans feature Metric and US Customary scales
- » All models can be used for both 3- and 4-point tests
- » Hardened rollers ensure test result accuracy by reducing undesirable loading and frictional forces on the specimen
- » Loading & supporting rollers are included
- » **Applications:** Flexural (bend) testing of metals, composites, plastics, and other materials
- » *See page 49 for roller options*



### Specifications

| Model                                               | 642.001A-02                                                | 642.001-SST                                               |
|-----------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|
| <b>Part Number</b>                                  | 100-033-663                                                | 100-201-458                                               |
| <b>Fixture Type</b>                                 | 3 & 4 Point Bend                                           | Stainless Steel 3 & 4 Point                               |
| <b>Force Capacity</b>                               | 1 kN (200 lbf)                                             | 1 kN (200 lbf)                                            |
| <b>Upper Grip Weight</b>                            | 3 Point- 0.045 kg (0.1 lbs)<br>4 Point- 0.11 kg (0.24 lbs) | 3 Point- 0.13 kg (0.28 lbs)<br>4 Point- 0.32 kg (0.7 lbs) |
| <b>Temperature Rating</b>                           | -59° C (-75° F) to 120° C (250° F)                         | -59° C (-75° F) to 120° C (250° F)                        |
| <b>Attachment Type</b>                              | C                                                          | C                                                         |
| <b>Combined Upper/Lower Fixture Height</b>          | 3 Point- 140 mm (5.5 in)<br>4 Point- 148 mm (5.8 in)       | 3 Point- 140 mm (5.5 in)<br>4 Point- 148 mm (5.8 in)      |
| <b>Fixture Width</b>                                | 75.2 mm (2.96 in)                                          | 75.2 mm (2.96 in)                                         |
| <b>Contact Radius Type</b>                          | Rolling                                                    | Rolling                                                   |
| <b>Loading Span (4 point) 0.5, 1 mm radius</b>      | 4-15.4 mm (0.16-0.6 in)                                    | 4-15.4 mm (0.16-0.6 in)                                   |
| <b>Loading Span (4 point) 1.5, 2, 2.5 mm radius</b> | 13.7-25 mm (.54-1 in)                                      | 13.7-25 mm (.54-1 in)                                     |
| <b>Supporting Span 0.5, 1 mm radius</b>             | 4-50 mm (0.16-1.97 in)                                     | 4-50 mm (0.16-1.97 in)                                    |
| <b>Supporting Span 1.5, 2, 2.5 mm radius</b>        | 13.7-59.7 mm (.54-2.35 in)                                 | 13.7-59.7 mm (.54-2.35 in)                                |
| <b>Specimen Width</b>                               | 25 mm (1 in)                                               | 25 mm (1 in)                                              |

### Integrated Specimen Interface

|                               |                                                                                     |                                                                                     |
|-------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Loading Nose Radius</b>    | 0.5 mm (0.02 in), 1 mm (0.04 in), 1.5 mm (0.06 in), 2 mm (0.08 in), 2.5 mm (0.1 in) | 0.5 mm (0.02 in), 1 mm (0.04 in), 1.5 mm (0.06 in), 2 mm (0.08 in), 2.5 mm (0.1 in) |
| <b>Supporting Nose Radius</b> | 0.5 mm (0.02 in), 1 mm (0.04 in), 1.5 mm (0.06 in), 2 mm (0.08 in), 2.5 mm (0.1 in) | 0.5 mm (0.02 in), 1 mm (0.04 in), 1.5 mm (0.06 in), 2 mm (0.08 in), 2.5 mm (0.1 in) |

## Bend Fixtures

### MTS Model 642 Three Point Bend Fixtures

- » MTS three point bend fixtures are designed to accommodate a variety of test configurations and standards
- » Model 642.01 can be used to meet ASTM D790, ASTM D7264, EN 2746, ISO 14125. The minimum nominal specimen thickness for the 4-point loading setup required by ISO 12125 Method B, is limited to 24 mm for smallest upper span.
- » Model 642.10 can be used to meet ASTM E399, ASTM D7264 and EN 2562. The minimum nominal specimen thickness for the 4-point loading setup required by ASTM D7264, is limited to 24 mm for smallest upper span.
- » Flexible configurations provide either a region of constant stress or a line of maximum stress
- » Adjustable spans feature Metric and US Customary scales
- » Rollers are sold separately
- » Rollers are sold in sets
- » **Applications:** Flexural (bend) testing of metals, composites, plastics, and other materials



642.01A-02



642.10B-02



642.25B-02

### Specifications

| Model                                           | 642.01A-02                                                | 642.01-SST                                               | 642.10B-02                                                 | 642.25B-02                                                 |
|-------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| <b>Part Number</b>                              | 100-024-684                                               | 100-203-454                                              | 100-024-686                                                | 100-024-688                                                |
| <b>Fixture Type</b>                             | 3 & 4 Point Bend                                          | Stainless Steel<br>3 & 4 Point Bend                      | 3 & 4 Point Bend                                           | 3 & 4 Point Bend                                           |
| <b>Force Capacity</b>                           | 12 kN (2,700 lbf)                                         | 12 kN (2,700 lbf)                                        | 125 kN (28,100 lbf)                                        | 300 kN (67,440 lbf)                                        |
| <b>Upper Fixture Weight</b>                     | 3 Point- 0.136 kg (0.3 lbs)<br>4 Point- 1.09 kg (2.4 lbs) | 3 Point- 0.41 kg (0.9 lbs)<br>4 Point- 3.27 kg (7.2 lbs) | 3 Point- 1.45 kg (3.2 lbs)<br>4 Point- 11.25 kg (24.8 lbs) | 3 Point- 3.86 kg (8.5 lbs)<br>4 Point- 17.78 kg (39.2 lbs) |
| <b>Temperature Rating</b>                       | -129° C (-200° F) to<br>150° C (300° F)                   | -129° C (-200° F) to<br>177° C (350° F)                  | -129° C (-200° F) to<br>177° C (350° F)                    | -129° C (-200° F) to<br>177° C (350° F)                    |
| <b>Attachment Type</b>                          | D                                                         | D                                                        | D                                                          | D                                                          |
| <b>Combined Upper/<br/>Lower Fixture Height</b> | 3 Point- 264 mm (10.4 in)<br>4 Point- 325 mm (12.8 in)    | 3 Point- 264 mm (10.4 in)<br>4 Point- 325 mm (12.8 in)   | 3 Point- 343 mm (13.5 in)<br>4 Point- 442 mm (17.4 in)     | 3 Point- 488 mm (19.2 in)<br>4 Point- 696 mm (27.4 in)     |
| <b>Fixture Width</b>                            | 177.8 mm (7 in)                                           | 177.8 mm (7 in)                                          | 368.3 mm (14.5 in)                                         | 673.1 mm (26.5 in)                                         |
| <b>Contact Radius Type</b>                      | Fixed                                                     | Fixed                                                    | Rolling                                                    | Rolling                                                    |
| <b>Loading Span (4 point)</b>                   | 23.9-76.2 mm (0.94-3 in)                                  | 23.9-76.2 mm (0.94-3 in)                                 | 50.8-152.4 mm (2-6 in)                                     | 50.8-203.2 mm (2-8 in)                                     |
| <b>Supporting Span</b>                          | 23.9-152.4 mm (0.94-6 in)                                 | 23.9-152.4 mm (0.94-6 in)                                | 38.1-304.8 mm (1.5-12 in)                                  | 78.7-609.6 mm (3.1-24 in)                                  |
| <b>Specimen Width</b>                           | 49.3 mm (1.94 in)                                         | 49.3 mm (1.94 in)                                        | 74.6 mm (2.94 in)                                          | 127 mm (5 in)                                              |

## Bend Fixtures

### Model 642.01 Optional Rollers

| Model            | Part Number | Compatible Fixtures | Roller Radius |
|------------------|-------------|---------------------|---------------|
| <b>642.01.01</b> | 051-284-601 | 642.01-02           | φ2.5 mm       |
| <b>642.01.02</b> | 051-284-603 | 642.01-02           | φ5 mm         |
| <b>642.01.03</b> | 051-284-602 | 642.01-02           | φ0.125 in     |
| <b>642.01.04</b> | 051-284-604 | 642.01-02           | φ0.25 in      |

### Model 642.01-SST Optional Rollers

|                     |             |            |           |
|---------------------|-------------|------------|-----------|
| <b>642.01.01SST</b> | 052-489-201 | 642.01-SST | φ2.5 mm   |
| <b>642.01.02SST</b> | 052-489-203 | 642.01-SST | φ5 mm     |
| <b>642.01.03SST</b> | 052-489-202 | 642.01-SST | φ0.125 in |
| <b>642.01.04SST</b> | 052-489-204 | 642.01-SST | φ0.25 in  |

### Model 642.10 Optional Rollers

|                  |             |            |            |
|------------------|-------------|------------|------------|
| <b>642.10.01</b> | 049-578-501 | 642.10A-02 | φ2.5 mm    |
| <b>642.10.02</b> | 049-578-503 | 642.10A-02 | φ5 mm      |
| <b>642.10.03</b> | 049-578-505 | 642.10A-02 | φ7.5 mm    |
| <b>642.10.04</b> | 049-578-507 | 642.10A-02 | φ10 mm     |
| <b>642.10.05</b> | 049-578-509 | 642.10A-02 | φ12.5 mm   |
| <b>642.10.06</b> | 049-578-502 | 642.10A-02 | φ0.125 in  |
| <b>642.10.07</b> | 049-578-510 | 642.10A-02 | φ0.1875 in |
| <b>642.10.08</b> | 049-578-504 | 642.10A-02 | φ0.25 in   |
| <b>642.10.09</b> | 049-578-506 | 642.10A-02 | φ0.375 in  |
| <b>642.10.10</b> | 049-578-508 | 642.10A-02 | φ0.50 in   |

### Model 642.25 Optional Rollers

|                  |             |            |           |
|------------------|-------------|------------|-----------|
| <b>642.25.01</b> | 050-875-202 | 642.25B-02 | φ10 mm    |
| <b>642.25.02</b> | 050-875-204 | 642.25B-02 | φ15 mm    |
| <b>642.25.03</b> | 050-875-207 | 642.25B-02 | φ20 mm    |
| <b>642.25.04</b> | 050-875-209 | 642.25B-02 | φ25 mm    |
| <b>642.25.05</b> | 050-875-201 | 642.25B-02 | φ0.375 in |
| <b>642.25.06</b> | 050-875-203 | 642.25B-02 | φ0.50 in  |
| <b>642.25.09</b> | 050-875-208 | 642.25B-02 | φ0.875 in |

*Note: Consult MTS Application Engineer for custom size radius and force capacity*

## Bend Fixtures

### MTS Fundamental Three Point Bend Fixtures

- » Affordable three point bend fixtures designed to support a wide variety of tests
- » Flexible configurations provide either a region of constant stress or a line of maximum stress
- » Precision machined rollers are made from corrosion-resistant hardened steel
- » Adjustable spans feature metric scales
- » **Applications:** Flexural (bend) testing of metals, composites, plastics, and other materials



### Specifications

| Model                                      | FWA104A                            | FWA105A                            | FWA305A                            | FWA605                         |
|--------------------------------------------|------------------------------------|------------------------------------|------------------------------------|--------------------------------|
| <b>Part Number</b>                         | 100-231-417                        | 100-231-418                        | 100-258-158                        | 100-504-190                    |
| <b>Fixture Type</b>                        | 3 Point Bend Fixture               | 3 Point Bend Fixture               | 3 Point Bend Fixture               | 3 Point Bend Fixture           |
| <b>Force Capacity</b>                      | 10 kN (2,248 lbf)                  | 100 kN (22,480 lbf)                | 300 kN (67,440 lbf)                | 600 kN (134,885 lbf)           |
| <b>Upper Fixture Weight</b>                | 0.6 kg (1.32 lbs)                  | 2 kg (4.4 lbs)                     | 5.67 kg (12.5 lbs)                 | 12 kg (26.5 lbs)               |
| <b>Temperature Rating</b>                  | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | -50° C (-58° F) to 150° C (302° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                     | D                                  | D                                  | E                                  | F                              |
| <b>Combined Upper/Lower Fixture Height</b> | 268 mm (10.6 in)                   | 376 mm (14.8 in)                   | 543 mm (21.4 in)                   | 735 mm (28.9 in)               |
| <b>Fixture Width</b>                       | 226 mm (8.9 in)                    | 464 mm (18.3 in)                   | 561 mm (22.1 in)                   | 186 mm (7.3 in)                |

### Integrated Specimen Interface

| Contact Radius Type           | Fixed                          | Rolling                 | Rolling                 | Rolling                 |
|-------------------------------|--------------------------------|-------------------------|-------------------------|-------------------------|
| <b>Loading Nose Radius</b>    | φ2 mm (0.08 in), 5 mm (0.2 in) | φ10 mm (0.39 in)        | φ15 mm (0.59 in)        | φ15 mm (0.59 in)        |
| <b>Supporting Nose Radius</b> | φ2 mm (0.08 in), 5 mm (0.2 in) | φ10 mm (0.39 in)        | φ15 mm (0.59 in)        | φ15 mm (0.59 in)        |
| <b>Loading Span</b>           | 40-160 mm (1.6-6.3 in)         | 30-360 mm (1.1-14.1 in) | 30-340 mm (1.1-13.4 in) | 60-370 mm (2.4-14.6 in) |
| <b>Specimen Width</b>         | 40 mm (1.6 in)                 | 80 mm (3.1 in)          | 90 mm (3.5 in)          | 119 mm (4.7 in)         |

## Bend Fixtures

### MTS Fundamental Specialty Three Point Bend Fixtures

- » Affordable three point bend fixtures for more unique applications
- » Loading edge and supports can be changed to optional parts or customized designs
- » Adjustable stepless lower span on the support beam
- » The support and loading edges are constructed of alloy tool steel with reliable surface hardness and durability
- » The rollers can rotate to minimize errors caused by friction
- » Fast and accurate specimen positioning with centering device
- » **Applications:** Flexural (bend) testing of wood, metals, composites, plastics, and other materials



### Specifications

| Model                                      | WA102A                         | ZWC104A                        | WA204A                         |
|--------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>Part Number</b>                         | 100-302-793                    | 100-302-802                    | 100-660-347                    |
| <b>Fixture Type</b>                        | 3 Point Bend Fixture           | 3 Point Bend Fixture           | 3 Point Bend Fixture           |
| <b>Force Capacity</b>                      | 0.5 kN (112 lbf)               | 10 kN (2,248 lbf)              | 20 kN (4,500 lbf)              |
| <b>Upper Fixture Weight</b>                | 0.28 kg (0.62 lbs)             | 1.1 kg (2.4 lb)                | 0.67 kg (1.5 lbs)              |
| <b>Temperature Rating</b>                  | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                     | 20                             | 20                             | 20                             |
| <b>Combined Upper/Lower Fixture Height</b> | 187.5 mm (7.4 in)              | 300 mm (11.8 in)               | 277 mm (10.9 in)               |
| <b>Fixture Width</b>                       | 42 mm (1.6 in)                 | 530 mm (20.9 in)               | 340 mm (13.4 in)               |

### Integrated Specimen Interface

| Contact Radius Type           | Fixed                  | Rolling                         | Fixed                         |
|-------------------------------|------------------------|---------------------------------|-------------------------------|
| <b>Loading Nose Radius</b>    | 1.5 mm (0.06 in)       | 7.5 mm (0.3 in), 15 mm (0.6 in) | 5 mm (0.2 in)                 |
| <b>Supporting Nose Radius</b> | 1.5 mm (0.06 in)       | 7.5 mm (0.3 in), 15 mm (0.6 in) | 2 mm (0.08 in), 5 mm (0.2 in) |
| <b>Loading Span</b>           | 10-100 mm (0.4-3.9 in) | 30-400 mm (1.2-15.7 in)         | 20-200 mm (0.8-7.87 in)       |
| <b>Specimen Width</b>         | 30 mm (1.2 in)         | 60 mm (2.3 in)                  | 45 mm (1.8 in)                |

## Specialty Fixtures

### MTS Fundamental 5 kN Puncture Fixture

- » Affordable puncture fixture
- » Plunger and base specimen holder are included
- » Plungers or clamping rings can be customized
- » **Applications:** Puncture resistance testing of plastic films, fabrics and other membrane materials

#### Specifications

|                                            |                                |
|--------------------------------------------|--------------------------------|
| <b>Model</b>                               | ZDPA503                        |
| <b>Part Number</b>                         | 100-302-835                    |
| <b>Fixture Type</b>                        | Puncture Fixture               |
| <b>Force Capacity</b>                      | 5 kN (1,125 lbf)               |
| <b>Upper Fixture Weight</b>                | 2.17 kg (4.8 lb)               |
| <b>Temperature Range</b>                   | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                     | 20                             |
| <b>Combined Upper/Lower Fixture Height</b> | 180 mm (7.1 in)                |
| <b>Fixture Width</b>                       | 42 mm (1.7 in)                 |

#### Integrated Specimen Interface

|                          |                             |
|--------------------------|-----------------------------|
| <b>Plunger Cylinder</b>  | ø50 mm (2 in)               |
| <b>Plunger Lead Edge</b> | 2.5 mm (0.1 in) edge radius |
| <b>Clamping Ring</b>     | ø150 mm ID (5.9 in)         |



### MTS Fundamental 90° Peel Fixture

- » Affordable 90° peel fixture designed with moveable X,Y table
- » Precision bearings maintain perpendicular axial alignment while measuring the force required to peel adhered material from a clamped-down substrate
- » Upper grip is not included.
- » **Applications:** Peel strength testing of flexible adhesive materials suitable for a variety of material testing standards including ASTM D1876, FINAT FTM1/2/3, and AFERA 4015 T4



#### Specifications

|                                                     |                                |
|-----------------------------------------------------|--------------------------------|
| <b>Model</b>                                        | FPF452                         |
| <b>Part Number</b>                                  | 100-170-762                    |
| <b>Fixture Type</b>                                 | 90° Peel                       |
| <b>Force Capacity</b>                               | 0.45 kN (100 lbf)              |
| <b>Upper Fixture Weight</b>                         | NA                             |
| <b>Temperature Rating</b>                           | 0° C (32° F) to 50° C (122° F) |
| <b>Attachment Type</b>                              | D                              |
| <b>Lower Fixture Height</b>                         | 140 mm (5.5 in)                |
| <b>Fixture Width</b>                                | 404 mm (15.9 in)               |
| <b>Specimen Travel</b><br>(Parallel to travel)      | 152.4 mm (6 in)                |
| <b>Specimen Travel</b><br>(Perpendicular to travel) | 101.6 mm (4 in)                |

#### Integrated Specimen Interface

|                  |                            |
|------------------|----------------------------|
| <b>Length</b>    | 165 mm (6.5 in)            |
| <b>Thickness</b> | 3.556 mm (0.140 in)        |
| <b>Width</b>     | 12.7-95.3 mm (0.5-3.75 in) |

# Specialty Fixtures

## MTS Fundamental Coefficient of Friction Fixture

- » Affordable coefficient of friction fixture
- » Pulley and string mechanism measures the force required to pull a friction sled over a material specimen
- » Suitable for a variety of material testing standards, including ASTM D1894 (plastic film), TAPPI T542 (paper and cardboard), TAPPI T549 (non-fibrous materials), and TAPPI T816 (corrugated).
- » Upper grip is not included.
- » **Applications:** Friction testing of plastic film, paper and cardboard, non-fibrous materials

## Specifications

|                      |                                |
|----------------------|--------------------------------|
| Model                | FCF103                         |
| Part Number          | 100-087-526                    |
| Fixture Type         | Coefficient of Friction        |
| Force Capacity       | 1 kN (225 lbf)                 |
| Upper Fixture Weight | NA                             |
| Temperature Rating   | 0° C (32° F) to 50° C (122° F) |
| Attachment Type      | D                              |
| Lower Fixture Height | 112 mm (4.4 in)                |
| Fixture Width        | 203 mm (8 in)                  |

## Integrated Specimen Interface

|                   |                  |
|-------------------|------------------|
| Length            | 279.4 mm (11 in) |
| Maximum Thickness | 5 mm (0.2 in)    |
| Width             | 152.4 mm (6 in)  |



# Bionix

Tension

## Bionix Bollard Grips

- » Stainless steel “horn” style bollard grips are designed to reduce stress concentration on specimens and avoid grip-induced failures
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Passivated stainless steel – suitable for saline environmental baths
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of cords, filaments, fibers, fine wire and biomaterials



### Specifications

| Model                                   | BMB103                              |
|-----------------------------------------|-------------------------------------|
| <b>Part Number</b>                      | 100-185-264                         |
| <b>Grip Type</b>                        | Stainless Steel Manual Bollard      |
| <b>Force Capacity</b>                   | 1 kN (225 lbf)                      |
| <b>Upper Grip Weight</b>                | 1.01 kg (2.2 lb)                    |
| <b>Temperature Rating</b>               | -130° C (202° F) to 150° C (302° F) |
| <b>Attachment Type</b>                  | D                                   |
| <b>Combined Upper/Lower Grip Height</b> | 280 mm (11 in)                      |
| <b>Grip Width</b>                       | 84 mm (3.3 in)                      |

### Integrated Specimen Interface

|                       |                    |
|-----------------------|--------------------|
| <b>Profile</b>        | Flat               |
| <b>Surface</b>        | Smooth Steel       |
| <b>Specimen Range</b> | 0-3 mm (0-0.12 in) |

## Bionix Scissor Grips

- » Stainless steel scissor grips with self-tightening and self-aligning design
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Passivated stainless steel – suitable for saline environmental baths
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of irregular bio-materials, bone, cartilage, tendons, and replacement bio-medical components



### Specifications

| Model                                   | BMS103                               |
|-----------------------------------------|--------------------------------------|
| <b>Part Number</b>                      | 100-181-625                          |
| <b>Grip Type</b>                        | Stainless Steel Manual Scissor       |
| <b>Force Capacity</b>                   | 1 kN (225 lbf)                       |
| <b>Upper Grip Weight</b>                | 0.85 kg (1.9 lb)                     |
| <b>Temperature Rating</b>               | -130° C (-202° F) to 250° C (482° F) |
| <b>Attachment Type</b>                  | D                                    |
| <b>Combined Upper/Lower Grip Height</b> | 346 mm (13.6 in)                     |
| <b>Grip Width</b>                       | 108 mm (4.3 in)                      |

### Integrated Specimen Interface

|                       |                    |
|-----------------------|--------------------|
| <b>Profile</b>        | Round              |
| <b>Surface</b>        | Diamond Tip Steel  |
| <b>Height</b>         | 16 mm (0.6 in)     |
| <b>Width</b>          | 25 mm (1.2 in)     |
| <b>Specimen Range</b> | 0-10 mm (0-0.4 in) |

# Bionix

Tension

## Bionix Roller Grips

- » Stainless steel roller grips with self-tightening and self-aligning design
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Passivated stainless steel – suitable for saline environmental baths
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of bandages, bio-textiles, diapers, synthetics, and flexible polymers



## Specifications

| Model                                   | BMR103                              | BMR203                                  | BMR503                                  |
|-----------------------------------------|-------------------------------------|-----------------------------------------|-----------------------------------------|
| <b>Part Number</b>                      | 100-185-262                         | 100-184-839                             | 100-184-841                             |
| <b>Grip Type</b>                        | Stainless Steel Roller              | Stainless Steel Roller                  | Stainless Steel Roller                  |
| <b>Force Capacity</b>                   | 1 kN (225 lbf)                      | 2 kN (550 lbf)                          | 5 kN (1,124 lbf)                        |
| <b>Upper Grip Weight</b>                | 1.3 kg (2.9 lb)                     | 1.42 kg (3.1 lb)                        | 2.26 kg (5.0 lb)                        |
| <b>Temperature Rating</b>               | -10° C (14° F) to<br>50° C (122° F) | -130° C (-202° F) to<br>250° C (482° F) | -130° C (-202° F) to<br>250° C (482° F) |
| <b>Attachment Type</b>                  | D                                   | D                                       | D                                       |
| <b>Combined Upper/Lower Grip Height</b> | 280 mm (11 in)                      | 254 mm (10 in)                          | 274 mm (10.8 in)                        |
| <b>Grip Width</b>                       | 60 mm (2.3 in)                      | 88 mm (3.5 in)                          | 120 mm (4.7 in)                         |

## Integrated Specimen Interface

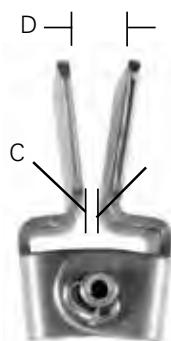
|                       |                   |                   |                   |
|-----------------------|-------------------|-------------------|-------------------|
| <b>Surface</b>        | Rubber            | Diamond Tip Steel | Diamond Tip Steel |
| <b>Specimen Range</b> | 0-3 mm (0-0.1 in) | 0-4 mm (0-0.2 in) | 0-7 mm (0-0.3 in) |
| <b>Maximum Width</b>  | 50 mm (2.0 in)    | 50 mm (2.0 in)    | 75 mm (2.9 in)    |

# Bionix

## Tension

### Bionix Spring Grips

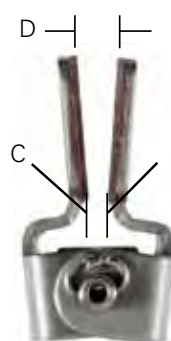
- » Stainless steel spring grips with lightweight design for use with low-force load cells
- » Spring action follow-through accommodates specimen neckdown
- » Faces pivot for self-alignment and for reduced likelihood of breakage at the specimen/face contact
- » Force of jaw tips (jaws parallel): 32 N  $\pm$  4.4 N (7.2 lbf  $\pm$  1.1 lbf)
- » Passivated stainless steel – suitable for saline environmental baths
- » Grips are sold in pairs
- » Two grip assemblies, two spare springs, two spare wires for link pin retainers are included with grip set.
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Low-force tensile testing as well as films, papers, textiles, and biomedical applications



Model BMS10A,  
fully open



Model BMS10A,  
jaws parallel



Model BMS10B,  
(with rubber face),  
fully open



Model BMS10B,  
(with rubber face),  
jaws parallel

### Specifications

| Model                                   | BMS10A                              | BMS10B                              |
|-----------------------------------------|-------------------------------------|-------------------------------------|
| <b>Part Number</b>                      | 056-644-001                         | 056-644-002                         |
| <b>Grip Type</b>                        | Stainless Steel Spring              | Stainless Steel Spring              |
| <b>Force Capacity</b>                   | 0.003 kN (0.67 lbf)                 | 0.01 kN (2.2 lbf)                   |
| <b>Upper Grip Weight</b>                | 0.078 kg (0.17 lbs)                 | 0.078 kg (0.17 lbs)                 |
| <b>Temperature Rating</b>               | -75° C (-103° F) to 200° C (392° F) | -75° C (-103° F) to 200° C (392° F) |
| <b>Attachment Type</b>                  | B                                   | B                                   |
| <b>Combined Upper/Lower Grip Height</b> | 190 mm (7.5 in)                     | 190 mm (7.5 in)                     |
| <b>Grip Width</b>                       | 35 mm (1.5 in)                      | 35 mm (1.5 in)                      |

### Integrated Specimen Interface

|                       |                        |                     |
|-----------------------|------------------------|---------------------|
| <b>Surface</b>        | Smooth Stainless Steel | Rubber Face         |
| <b>Length</b>         | 12.7 mm (0.5 in)       | 12.7 mm (0.5 in)    |
| <b>Specimen Range</b> | 0-2.6 mm (0-0.1 in)    | 0-2.6 mm (0-0.1 in) |
| <b>Maximum Width</b>  | 25 mm (1 in)           | 25 mm (1 in)        |
| <b>Span B</b>         | 0.0                    | 0.0                 |
| <b>Span C</b>         | 1.0 mm (0.039 in)      | 1.0 mm (0.039 in)   |
| <b>Span D</b>         | 2.6 mm (0.103 in)      | 2.6 mm (0.103 in)   |

## Bionix

### Tension

#### Bionix Vise Grips

- » Stainless steel vise grips with a clamping screw design to tighten a vise
- » Anti-rotation features and integrated alignment pins enhance test accuracy and repeatability
- » Passivated stainless steel – suitable for saline environmental baths
- » Grips are sold in pairs
- » Specimen interface (“face”) is integrated with each grip
- » **Applications:** Tensile testing of plastic film, textile, sheet materials, bandages, bio-textiles, diapers, plastic films, packaging components and biomaterials in a fluid bath



#### Specifications

| Model                            | BMV102                           | BMV203                           | BMV503                           |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Part Number                      | 100-186-411                      | 100-174-783                      | 100-186-413                      |
| Grip Type                        | Stainless Steel Manual Vise      | Stainless Steel Manual Vise      | Stainless Steel Manual Vise      |
| Force Capacity                   | 0.1 kN (22 lbf)                  | 2 kN (450 lbf)                   | 5 kN (1,124 lbf)                 |
| Upper Grip Weight                | 0.56 kg (1.23 lb)                | 1.0 kg (2.2 lb)                  | 3.1 kg (6.8 lb)                  |
| Temperature Rating               | -10° C (14° F) to 50° C (122° F) | -10° C (14° F) to 50° C (122° F) | -10° C (14° F) to 50° C (122° F) |
| Attachment Type                  | D                                | D                                | D                                |
| Combined Upper/Lower Grip Height | 230 mm (9 in)                    | 236 mm (9.3 in)                  | 300 mm (11.8 in)                 |
| Grip Width                       | 71.5 mm (2.8 in)                 | 93 mm (3.7 in)                   | 147 mm (5.8 in)                  |

#### Integrated Specimen Interface

|                |                    |                      |                    |
|----------------|--------------------|----------------------|--------------------|
| Profile        | Flat               | Flat                 | Flat               |
| Surface        | Rubber             | Rubber               | Rubber             |
| Height         | 10 mm (0.4 in)     | 20 mm (0.8 in)       | 50 mm (2.0 in)     |
| Width          | 10 mm (0.4 in)     | 65 mm (2.6 in)       | 80 mm (3.1 in)     |
| Specimen Range | 0-2 mm (0-0.08 in) | 0-3.5 mm (0-0.14 in) | 0-10 mm (0-0.4 in) |

## Bionix

### Compression

#### Bionix Stainless Steel Compression Platens

- » Stainless steel compression platen designed for durability
- » Precision-ground, hardened surface design enhances platen durability
- » Specimen centering grooves, anti-rotation features and integrated alignment pins improve test accuracy and repeatability
- » Passivated stainless steel – suitable for saline environmental baths
- » Platens are sold in pairs (upper and lower)
- » **Applications:** Compression testing of irregular biomaterials, bone, cartilage, tendons, replacement bio-medical components



#### Specifications

| Model                                                      | BCP104A                              | BCP104B                              | BCP104C                              |
|------------------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                                         | 100-182-229                          | 100-182-227                          | 100-203-455                          |
| <b>Platen Type</b>                                         | Fixed/Fixed Stainless Steel Platen   | Fixed/Fixed Stainless Steel Platen   | Fixed/Fixed Stainless Steel Platen   |
| <b>Force Capacity</b>                                      | 10 kN (2,250 lbf)                    | 10 kN (2,250 lbf)                    | 10 kN (2,250 lbf)                    |
| <b>Minimum Specimen Diameter at Maximum Force Capacity</b> | 5 mm (0.2 in)                        | 5 mm (0.2 in)                        | 5 mm (0.2 in)                        |
| <b>Upper Platen Weight</b>                                 | 0.68 kg (1.5 lbs)                    | 1.82 kg (4 lbs)                      | 0.3 kg (0.66 lbs)                    |
| <b>Temperature Range</b>                                   | -130° C (-202° F) to 250° C (482° F) | -130° C (-202° F) to 250° C (482° F) | -130° C (-202° F) to 250° C (482° F) |
| <b>Attachment Type</b>                                     | D                                    | D                                    | M6 x 1                               |
| <b>Combined Upper/Lower Platen Height</b>                  | 148 mm (5.9 in)                      | 148 mm (5.9 in)                      | 50 mm (2 in)                         |
| <b>Platen Width</b>                                        | 50 mm (2 in)                         | 100 mm (3.9 in)                      | 40 mm (1.6 in)                       |

# Bionix

## Fluid Bath

### Bionix EnviroBath

- » Supports saline and protein-based fluid baths to provide maximum flexibility
- » Easy set-up, operation and disassembly simplifies cleaning and maintenance
- » Highly reliable temperature control system enhances test accuracy
- » Accommodates the Bionix Grips and Fixtures portfolio to enable a broad variety of test specimens
- » Leak-proof access panels enable easy change out of accessories and specimens
- » Compatible with video or laser extensometers
- » **Applications:** Mechanical testing of medical device, biomaterial specimens in fluids heated to body temperatures



Bionix EnviroBath 1

### General Specifications

| Power (V AC, HZ, A) |                          |
|---------------------|--------------------------|
| <b>US:</b>          | 120 V AC, 50/60 Hz, 11 A |
| <b>Europe:</b>      | 240 V AC, 50 Hz, 10 A    |

### Specifications

| Model                     | Bionix EnviroBath 1                          | Bionix EnviroBath 6                          | Bionix EnviroBath 10                         |
|---------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| <b>Part Number</b>        | Configurable                                 | Configurable                                 | Configurable                                 |
| <b>Volume</b>             | 1 L (0.26 gal)                               | 6 L (1.6 gal)                                | 10 L (2.6 gal)                               |
| <b>Force Capacity</b>     | 2.4 kN (540 lbf)                             | 2.4 kN (540 lbf)                             | 10 kN (2248 lbf)                             |
| <b>Temperature Rating</b> | 5° C (41° F) above ambient to 40° C (104° F) | 5° C (41° F) above ambient to 40° C (104° F) | 5° C (41° F) above ambient to 40° C (104° F) |
| <b>Stability</b>          | ±2° C (±3.6° F) at 37° C (98.6° F)           | ±2° C (±3.6° F) at 37° C (98.6° F)           | ±2° C (±3.6° F) at 37° C (98.6° F)           |
| <b>Internal Width</b>     | 100 mm (4 in)                                | 130 mm (5 in)                                | 215 mm (8.5 in)                              |
| <b>Internal Height</b>    | 200 mm (8 in)                                | 480 mm (19 in)                               | 305 mm (12 in)                               |
| <b>Internal Depth</b>     | 56 mm (2.2 in)                               | 100 mm (3.9 in)                              | 150 mm (5.8 in)                              |
| <b>External Width</b>     | 180 mm (7 in)                                | 205 mm (8 in)                                | 295 mm (11.5 in)                             |
| <b>External Height</b>    | 295 mm (11.5 in)                             | 575 mm (22.5 in)                             | 395 mm (15.5 in)                             |
| <b>External Depth</b>     | 95 mm (3.65 in)                              | 140 mm (5.5 in)                              | 190 mm (7.4 in)                              |

## Bionix

### Fluid Bath



### Fluid Bath Options

| Description                        | 1 liter | 6 liter | 10 liter |
|------------------------------------|---------|---------|----------|
| <b>Sprayer Option</b>              |         | ✓       | ✓        |
| <b>Protein Based Fluid</b>         | ✓       | ✓       | ✓        |
| <b>Horizontal</b>                  | ✓       | ✓       | ✓        |
| <b>Digital Temperature Monitor</b> | ✓       | ✓       | ✓        |
| <b>Upper Pull Rod (SST)</b>        | ✓       | ✓       | ✓        |

### Compatibility Matrix\*

| Grips and Fixtures                            | Page | 1 liter | 6 liter | 10 liter |
|-----------------------------------------------|------|---------|---------|----------|
| <b>Bionix Vise Grips, 0.1 kN</b>              | 57   | ✓       | ✓       | ✓        |
| <b>Model 642.001 Bend Fixture (SST), 1 kN</b> | 47   | ✓       | ✓       | ✓        |
| <b>Bionix Manual Thumb Vise Grip, 0.1 kN</b>  | 24   | ✓       | ✓       | ✓        |
| <b>Bionix Compression Platens, 40 mm</b>      | 58   | ✓       | ✓       | ✓        |
| <b>Bionix Spring Grips, 0.003 kN, 0.01 kN</b> | 56   |         | ✓       | ✓        |
| <b>Bionix Compression Platens, 50 mm</b>      | 58   |         | ✓       | ✓        |
| <b>Bionix Vise Grips, 2 kN</b>                | 57   |         | ✓       | ✓        |
| <b>Bionix Roller Grips, 1 kN</b>              | 55   |         | ✓       | ✓        |
| <b>Model 642.01 Bend Fixture (SST), 12 kN</b> | 48   |         |         | ✓        |
| <b>Bionix Compression Platens, 100 mm</b>     | 58   |         |         | ✓        |

Note: EnviroBath 10 is compatible with customer-supplied spinal fixture per ASTM F1717-01.

Some grips available in titanium. Contact MTS for additional information.

\* Vertical Orientation

# Composites

## Modified Celanese Compression Loading Fixture

- » Celanese compression fixture is constructed from high-quality stainless steel
- » Design based on the University of Wyoming Modified Celanese Compression Test Fixture
- » Includes wedges with flame sprayed high friction surface
- » Requires compression platens for mounting (*purchased separately*)
- » **Applications:** Compression testing in accordance with ISO 14126 Method 1A



CMP.001

### Specifications

| Model              | CMP.001                                       |
|--------------------|-----------------------------------------------|
| Part Number        | 100-351-817                                   |
| Fixture Type       | Modified Celanese Compression Loading Fixture |
| Force Capacity     | 88 kN (20 kip)                                |
| Fixture Weight     | 7.3 kg (16 lbs)                               |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F)          |
| Attachment Type    | N/A                                           |
| Fixture Height     | 191 mm (7.5 in)                               |
| Fixture Width      | 89 mm (3.5 in)                                |

### Integrated Specimen Interface

|                |                            |
|----------------|----------------------------|
| Length         | 114.3 mm (4.5 in)          |
| Specimen Range | 3.8-6.35 mm (0.15-0.25 in) |
| Maximum Width  | 12.7 mm (0.5 in)           |

## IITRI Compression Loading Fixture

- » IITRI compression fixture is constructed from high-quality stainless steel
- » Includes set of wedges to accommodate specimen thicknesses from 5.1 - 10.2 mm (0.2 - 0.4 in)
- » Wedges that support 0-5.1 mm (0-0.2 in) and 10.2-15.2 mm (0.4-0.6 in) specimen thicknesses are available on request.
- » Requires threaded adapters or compression platens for mounting (*purchased separately*)
- » **Applications:** Compression testing in accordance with ASTM D3410/D3410M and ISO 14126 Method 1B



CMP.002

### Specifications

| Model              | CMP.002                              |
|--------------------|--------------------------------------|
| Part Number        | 100-351-818                          |
| Fixture Type       | IITRI Compression Loading Fixture    |
| Force Capacity     | 267 kN (60 kip)                      |
| Fixture Weight     | 36 kg (80 lbs)                       |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F) |
| Attachment Type    | M30 x 2                              |
| Fixture Height     | 356 mm (14 in)                       |
| Fixture Width      | 178 mm (7 in)                        |

### Integrated Specimen Interface

|                |                          |
|----------------|--------------------------|
| Length         | 140 mm (5.5 in)          |
| Specimen Range | 5.1-10.2 mm (0.2-0.4 in) |
| Maximum Width  | 25.4 mm (1 in)           |

## Composites

### Combined Loading Compression (CLC) Test Fixture

- » CLC compression fixture is constructed from high-quality stainless steel
- » Requires compression platens for mounting (*purchased separately*)
- » **Applications:** Compression testing in accordance with ASTM D6641/D6641M



#### Specifications

| Model              | CMP.003                              |
|--------------------|--------------------------------------|
| Part Number        | 100-351-819                          |
| Fixture Type       | Combined Loading Compression Fixture |
| Force Capacity     | 89 kN (20 kip)                       |
| Fixture Weight     | 6.8 kg (15 lbs)                      |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F) |
| Attachment Type    | NA                                   |
| Fixture Height     | 140 mm (5.5 in)                      |
| Fixture Width      | 107 mm (4.2 in)                      |

#### Integrated Specimen Interface

|                |                      |
|----------------|----------------------|
| Length         | 140 mm (5.5 in)      |
| Specimen Range | 0-12.7 mm (0-0.5 in) |
| Maximum Width  | 25.4 mm (1 in)       |

### V-Notched Rail Shear Test Fixture

- » V-Notched rail shear fixture is constructed from high-quality stainless steel
- » Requires threaded adapter for top and bottom mounting (*purchased separately*)
- » **Applications:** Shear testing in accordance with ASTM D7078/D7078M



#### Specifications

| Model                        | CMP.004                              |
|------------------------------|--------------------------------------|
| Part Number                  | 100-351-820                          |
| Fixture Type                 | V-Notched Rail Shear Fixture         |
| Force Capacity               | 44 kN (10 kip)                       |
| Fixture Weight               | 7.7 kg (17 lbs)                      |
| Temperature Rating           | -152° C (-240° F) to 318° C (600° F) |
| Mounting Thread Insert Sizes | 1"-14                                |
| Fixture Height               | 165 mm (6.5 in)                      |
| Fixture Width                | 102 mm (4 in)                        |

#### Integrated Specimen Interface

|                |                      |
|----------------|----------------------|
| Maximum Length | 76 mm (3 in)         |
| Specimen Range | 0-12.7 mm (0-0.5 in) |
| Maximum Width  | 55.6 mm (2.2 in)     |

## Composites

### V-Notched Beam (Iosipescu) Shear Fixture

- » V-Notched beam shear fixture is constructed from high-quality stainless steel
- » Includes adjustable wedges
- » Requires threaded adapter for top and compression platen for bottom mounting (*purchased separately*)
- » **Applications:** Shear testing in accordance with ASTM D5379/D5379M



CMP.005

### Specifications

| Model                        | CMP.005                              |
|------------------------------|--------------------------------------|
| Part Number                  | 100-087-239                          |
| Fixture Type                 | V-Notched Beam Shear Fixture         |
| Force Capacity               | 44 kN (10 kip)                       |
| Fixture Weight               | 6.8 kg (15 lbs)                      |
| Temperature Rating           | -152° C (-240° F) to 318° C (600° F) |
| Mounting Thread Insert Sizes | 1/2"-20                              |
| Fixture Height               | 115 mm (4.5 in)                      |
| Fixture Width                | 153 mm (6 in)                        |

### Integrated Specimen Interface

|                |                            |
|----------------|----------------------------|
| Length         | 76 mm (3.0 in)             |
| Specimen Range | 0.76-12.7 mm (0.03-0.5 in) |
| Maximum Width  | 19.0 mm (0.75 in)          |

### Short-Beam Strength Fixture

- » Short-beam strength fixture is constructed from high-quality stainless steel
- » Adjustable support span
- » Supports include specimen center tabs for accurate specimen alignment
- » Requires female clevis adapter or compression platen for top and threaded adapter or compression platen for bottom mounting (*purchased separately*)
- » **Applications:** Strength testing in accordance with ASTM D2344 (please contact MTS for fixture in accordance to ASTM D2344M)



CMP.006

### Specifications

| Model                    | CMP.006                              |
|--------------------------|--------------------------------------|
| Part Number              | 100-351-821                          |
| Fixture Type             | Short-Beam Strength Fixture          |
| Force Capacity           | 8.9 kN (2 kip)                       |
| Fixture Weight           | 6.8 kg (15 lbs)                      |
| Temperature Rating       | -152° C (-240° F) to 318° C (600° F) |
| Top Mounting Male Clevis | 12 mm (Type O)                       |
| Fixture Height           | 290 mm (11.4 in)                     |
| Fixture Width            | 178 mm (7 in)                        |
| Loading Nose Radius      | 3.175 mm (0.125 in)                  |
| Supporting Nose Radius   | 1.588 mm (0.063 in)                  |

### Integrated Specimen Interface

|                   |                         |
|-------------------|-------------------------|
| Supporting Span   | 3.2-152 mm (0.125-6 in) |
| Maximum Thickness | 50 mm (2 in)            |
| Maximum Width     | 38 mm (1.5 in)          |

### CMP.006 Optional Specimen Interfaces

| Model      | Part Number | Profile         | Radius         | Temperature Range                    |
|------------|-------------|-----------------|----------------|--------------------------------------|
| CMP.006.01 | 100-352-347 | Loading Nose    | 5 mm (0.2 in)  | -152° C (-200° F) to 318° C (600° F) |
| CMP.006.02 | 100-352-348 | Supporting Nose | 2 mm (0.08 in) | -152° C (-200° F) to 318° C (600° F) |

# Composites

## Mixed Mode Bending Fixture

- » Mixed mode bend fixture is constructed from high-quality stainless steel and aluminum
- » Includes 5 sets of specimen hinges
- » Requires threaded adapter for top and compression platen for bottom mounting (*purchased separately*)
- » **Applications:** Flexure (bend) testing in accordance with ASTM D6671/D6671M



CMP.007

## Specifications

| Model                            | CMP.007                             |
|----------------------------------|-------------------------------------|
| Part Number                      | 100-351-822                         |
| Fixture Type                     | Mixed Mode Bending Fixture          |
| Force Capacity                   | 4.4 kN (1 kip)                      |
| Fixture Weight                   | 7.3 kg (16 lbs)                     |
| Temperature Rating               | -85° C (-120° F) to 122° C (250° F) |
| Top Mounting Threaded Stud Sizes | 1/4"-28                             |
| Fixture Height                   | 203 mm (8 in)                       |
| Fixture Width                    | 254 mm (10 in)                      |

## Integrated Specimen Interface

|                   |                   |
|-------------------|-------------------|
| Maximum Length    | 228 mm (9.0 in)   |
| Maximum Thickness | 6.35 mm (0.25 in) |
| Maximum Width     | 38 mm (1.5 in)    |

## Open / Filled Hole Compression Fixture

- » Open / Filled hole compression fixture is constructed from high-quality stainless steel
- » Requires compression platens or hydraulic grips for mounting (*purchased separately*)
- » **Applications:** Compression testing in accordance with ASTM D6484, ASTM D6742 and BS 07260 (please contact MTS for fixture in accordance with ASTM D6484M and ASTM D6742M)

*Note: Fixture thickness for gripping = 30 mm (1.18 in) + specimen thickness.*



CMP.008

## Specifications

| Model              | CMP.008                              |
|--------------------|--------------------------------------|
| Part Number        | 100-351-823                          |
| Fixture Type       | Open Hole Compression Fixture        |
| Force Capacity     | 222 kN (50 kip)                      |
| Fixture Weight     | 6.8 kg (15 lbs)                      |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F) |
| Attachment Type    | N/A                                  |
| Fixture Height     | 305 mm (12 in)                       |
| Fixture Width      | 76 mm (3 in)                         |

## Integrated Specimen Interface

|                |                |
|----------------|----------------|
| Maximum Length | 305 mm (12 in) |
| Specimen Range | 12.7 mm (0.5)  |
| Maximum Width  | 38 mm (1.5 in) |

## Composites

### Compression After Impact Test Fixture

- » Compression after impact test fixture is constructed from high-quality stainless steel
- » Requires threaded adapter for top and compression platen for bottom mounting (*purchased separately*)
- » **Applications:** Compression testing in accordance with ASTM D7137 (please contact MTS for fixture in accordance with ASTM D7137M)



CMP.009

### Specifications

| Model              | CMP.009                              |
|--------------------|--------------------------------------|
| Part Number        | 100-351-824                          |
| Fixture Type       | Compression After Impact Fixture     |
| Force Capacity     | 222 kN (50,000 lbs)                  |
| Fixture Weight     | 16 kg (35 lbs)                       |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F) |
| Mounting Thread    | 1/2"-13                              |
| Insert Sizes       |                                      |
| Fixture Height     | 198 mm (7.8 in)                      |
| Fixture Width      | 356 mm (14 in)                       |

### Integrated Specimen Interface

|                |                              |
|----------------|------------------------------|
| Length         | 152 mm (6 in)                |
| Specimen Range | 3.175-12.7 mm (0.125-0.5 in) |
| Width          | 102 mm (4 in)                |

### Flatwise Plane Shear Fixture, Tensile Mode

- » Flatwise plane shear test fixture is constructed from high-quality stainless steel
- » Includes three sets of aluminum bonding plates
- » Requires threaded adapter for top and bottom mounting (*purchased separately*)
- » **Applications:** Shear testing in Tensile mode in accordance with ASTM C273/C273M and ASTM C394/C394M (Fatigue)



CMP.010

### Specifications

| Model              | CMP.010                              |
|--------------------|--------------------------------------|
| Part Number        | 100-204-294                          |
| Fixture Type       | Flatwise Plane Shear Tensile Fixture |
| Force Capacity     | 89 kN (20 kip)                       |
| Fixture Weight     | 14.5 kg (32 lbs)                     |
| Temperature Rating | -152° C (-240° F) to 318° C (600° F) |
| Mounting Thread    | 1"-14                                |
| Insert Sizes       |                                      |
| Fixture Height     | 470 mm (18.5 in)                     |
| Fixture Width      | 76 mm (3 in)                         |

### Integrated Specimen Interface

|                |                            |
|----------------|----------------------------|
| Maximum Length | 229 mm (9 in)              |
| Specimen Range | 6.3-19.1 mm (0.25-0.75 in) |
| Maximum Width  | 76 mm (3 in)               |

\* Temperature Range of Aluminum Bonding Plates -85 to 122°C (-120 to 250°F)

## Composites

### Flatwise Plane Shear Fixture, Compression Mode

- » Flatwise plane shear test fixture is constructed from high-quality stainless steel
- » Includes three sets of aluminum bonding plates
- » Requires threaded adapter for top and bottom mounting (*purchased separately*)
- » **Applications:** Shear testing in Compression mode in accordance with ASTM C273/C273M and ASTM C394/C394M (Fatigue)



### Specifications

| Model                               | CMP.011                                  |
|-------------------------------------|------------------------------------------|
| <b>Part Number</b>                  | 100-056-205                              |
| <b>Fixture Type</b>                 | Flatwise Plane Shear Compression Fixture |
| <b>Force Capacity</b>               | 89 kN (20 kip)                           |
| <b>Fixture Weight</b>               | 14.5 kg (32 lbs)                         |
| <b>Temperature Rating</b>           | -152° C (-240° F) to 318° C (600° F)     |
| <b>Mounting Thread Insert Sizes</b> | 1"-14                                    |
| <b>Fixture Height</b>               | 368 mm (14.5 in)                         |
| <b>Fixture Width</b>                | 76 mm (3.0 in)                           |

### Integrated Specimen Interface

|                       |                            |
|-----------------------|----------------------------|
| <b>Maximum Length</b> | 228.6 mm (9 in)            |
| <b>Specimen Range</b> | 6.3-19.1 mm (0.25-0.75 in) |
| <b>Maximum Width</b>  | 76 mm (3.0 in)             |

*\*Temperature Range of Aluminum Bonding Plates -85 to 122°C (-120 to 250°F).*

### Climbing Drum Peel Fixture with Roller Type Grips

- » Climbing drum peel test fixture is constructed from high-quality stainless steel
- » Requires threaded adapter for top and bottom mounting (*purchased separately*)
- » **Applications:** Peel testing in accordance with ASTM D1781 (please contact MTS for fixture in accordance to with ASTM D1781M)



### Specifications

| Model                               | CMP.012                             |
|-------------------------------------|-------------------------------------|
| <b>Part Number</b>                  | 100-363-421                         |
| <b>Fixture Type</b>                 | Climbing Drum Peel Fixture          |
| <b>Force Capacity</b>               | 2.2 kN (0.5 kip)                    |
| <b>Fixture Weight</b>               | 13.6 kg (30 lbs)                    |
| <b>Temperature Rating</b>           | -85° C (-120° F) to 122° C (250° F) |
| <b>Mounting Thread Insert Sizes</b> | 1"-14                               |
| <b>Fixture Height</b>               | 671 mm (26.4 in)                    |
| <b>Fixture Width</b>                | 183 mm (7.2 in)                     |

### Integrated Specimen Interface

|                       |                           |
|-----------------------|---------------------------|
| <b>Length</b>         | 254 mm (10 in)            |
| <b>Specimen Range</b> | 0.762-25.4 mm (0.03-1 in) |
| <b>Width</b>          | 25.4-102 mm (1-4 in)      |

# Composites

## 3 & 4 Point Sandwich Beam Flexure / Shear Fixture

- » 3 & 4 point sandwich beam test fixture is constructed from high strength steel with a durable black oxide finish (except for rollers and pads)
- » Adjustable loading and support spans
- » Loading and support bars are supplied with loading pins and flat steel loading blocks held in alignment with springs (rubber pads not included)
- » Requires threaded adapter for top and bottom mounting (*purchased separately*)
- » **Applications:** Flexure (bend) testing in accordance with ASTM C393/C393M, ASTM D5467/D5467M, ASTM D7249/D7249M and ASTM D7250/D7250M

## Specifications

|                              |                                     |
|------------------------------|-------------------------------------|
| Model                        | CMP.013                             |
| Part Number                  | 100-351-826                         |
| Fixture Type                 | Short-Beam Strength Fixture         |
| Force Capacity               | 11 kN (2.5 kip)                     |
| Fixture Weight               | 52 kg (114 lbs)                     |
| Temperature Rating           | -85° C (-120° F) to 122° C (250° F) |
| Mounting Thread Insert Sizes | 1"-14                               |
| Fixture Height               | 389 mm (15.3 in)                    |
| Fixture Width                | 635 mm (25 in)                      |
| Loading Nose Radius          | 51-305 mm (2-12 in)                 |
| Supporting Nose Radius       | 152-610 mm (6-24 in)                |

## Integrated Specimen Interface

|                |                |
|----------------|----------------|
| Maximum Length | 610 mm (24 in) |
| Maximum Width  | 100 mm (4 in)  |



CMP.013

## Force Transducers / Load Cells

### S-Beam Load Cells for Criterion Systems

- » S-Beam load cells for Criterion systems are designed for accuracy and linearity
- » Measures axial loads using S-shaped design with a single embedded strain gage
- » Offers exceptional value and extreme simplicity for low-capacity testing with minimal side loads
- » **Applications:** Ideal for low-force tension and compression testing of plastics, elastomers (rubbers), and paper



### Specifications

| Model          | Part Number | Type   | Force Rating | Accuracy                 | Overload Protection | Mounting Thread |
|----------------|-------------|--------|--------------|--------------------------|---------------------|-----------------|
| <b>LSB.100</b> | 057-513-001 | S-beam | 1 N          | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.500</b> | 057-481-201 | S-beam | 5 N          | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.101</b> | 057-481-202 | S-beam | 10 N         | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.251</b> | 057-481-203 | S-beam | 25 N         | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.501</b> | 057-481-204 | S-beam | 50 N         | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.102</b> | 057-481-205 | S-beam | 100 N        | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.252</b> | 057-481-206 | S-beam | 250 N        | class 0.5 from 1 to 100% | 800% of capacity    | M6 x 1          |
| <b>LSB.502</b> | 057-481-301 | S-beam | 500 N        | class 0.5 from 1 to 100% | 420% of capacity    | M6 x 1          |
| <b>LSB.103</b> | 057-481-302 | S-beam | 1000 N       | class 0.5 from 1 to 100% | 420% of capacity    | M6 x 1          |
| <b>LSB.203</b> | 057-481-303 | S-beam | 2000 N       | class 0.5 from 1 to 100% | 420% of capacity    | M6 x 1          |
| <b>LSB.503</b> | 057-496-001 | S-beam | 5000 N       | class 0.5 from 1 to 100% | 420% of capacity    | M12 x 1.25      |

### Low Profile Bending Beam Load Cells for Criterion Systems

- » Bending beam load cells for Criterion systems are designed for high accuracy, stiffness, overturning moment, stability, and linearity
- » Measure moderate axial loads using a compact design with four embedded strain gages
- » Low profile maximizes available test space
- » **Applications:** Ideal for low-force tension and compression testing of soft metals, plastics and reinforced plastics



### Specifications

| Model          | Part Number | Type                | Force Rating | Accuracy                 | Overload Protection | Mounting Thread |
|----------------|-------------|---------------------|--------------|--------------------------|---------------------|-----------------|
| <b>LPB.102</b> | 057-481-401 | Low profile bending | 100 N        | class 0.5 from 1 to 100% | 150% of capacity    | M6 x 1          |
| <b>LPB.252</b> | 057-481-402 | Low profile bending | 250 N        | class 0.5 from 1 to 100% | 150% of capacity    | M6 x 1          |
| <b>LPB.502</b> | 057-481-403 | Low profile bending | 500 N        | class 0.5 from 1 to 100% | 150% of capacity    | M6 x 1          |

## Force Transducers / Load Cells

### Low Profile Shear Beam Load Cells for Criterion Systems

- » Shear beam load cells for Criterion systems are designed for high accuracy, stiffness, overturning moment, stability, and linearity
- » Measure moderately high axial loads using a unique design of four embedded strain gages
- » Low profile maximizes available test space
- » **Applications:** Ideal for low-force tension and compression testing of brittle metals and composites



### Specifications

| Model          | Part Number | Type                   | Force Rating | Accuracy                 | Overload Protection | Mounting Thread |
|----------------|-------------|------------------------|--------------|--------------------------|---------------------|-----------------|
| <b>LPS.103</b> | 057-481-501 | Low profile shear beam | 1 kN         | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.253</b> | 057-481-502 | Low profile shear beam | 2.5 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.503</b> | 057-481-503 | Low profile shear beam | 5 kN         | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.104</b> | 057-481-504 | Low profile shear beam | 10 kN        | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.204</b> | 057-481-506 | Low profile shear beam | 20 kN        | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.304</b> | 057-481-505 | Low profile shear beam | 30 kN        | class 0.5 from 1 to 100% | 150% of capacity    | M12 x 1.25      |
| <b>LPS.504</b> | 057-481-701 | Low profile shear beam | 50 kN        | class 0.5 from 1 to 100% | 150% of capacity    | M27 x 2         |
| <b>LPS.105</b> | 057-481-702 | Low profile shear beam | 100 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M27 x 2         |
| <b>LPS.155</b> | 057-481-703 | Low profile shear beam | 150 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M27 x 2         |
| <b>LPS.205</b> | 057-481-901 | Low profile shear beam | 200 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M36 x 2         |
| <b>LPS.305</b> | 057-481-801 | Low profile shear beam | 300 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M36 x 2         |
| <b>LPS.505</b> | 058-497-801 | Low profile shear beam | 500 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M72 x 2         |
| <b>LPS.605</b> | 058-497-802 | Low profile shear beam | 600 kN       | class 0.5 from 1 to 100% | 150% of capacity    | M72 x 2         |

## Force Transducers / Load Cells

### S-Beam Load Cells for Exceed Systems

- » S-beam load cells for Exceed systems are designed for accuracy and linearity
- » Measures axial loads using S-shaped design with a single embedded strain gage
- » Offers exceptional value and extreme simplicity for low-capacity testing with minimal side loads
- » **Applications:** Ideal for low-force tension and compression testing of plastics, elastomers (rubbers), and paper



### Specifications

| Model                | Part Number | Load Cell Type | Mounting Threads | Capacity |
|----------------------|-------------|----------------|------------------|----------|
| <b>LPS-0.6KGY</b>    | 100-475-294 | S-beam         | M6X1.0           | 5 N      |
| <b>LPS-1KGY</b>      | 100-475-293 | S-beam         | M6X1.0           | 10 N     |
| <b>LPS-2KGY</b>      | 100-475-292 | S-beam         | M6X1.0           | 20 N     |
| <b>BAB-XS-5MY</b>    | 100-475-291 | S-beam         | M8X1.25          | 50 N     |
| <b>BAB-XS-10MY</b>   | 100-475-290 | S-beam         | M8X1.25          | 100 N    |
| <b>BSA-XS-25KGY</b>  | 100-475-289 | S-beam         | M6X1.0           | 200 N    |
| <b>BSA-XS-50KGY</b>  | 100-475-227 | S-beam         | M6X1.0           | 500 N    |
| <b>BSS-XS-100KGY</b> | 100-475-288 | S-beam         | M10X1.5          | 1 kN     |
| <b>BSS-200KGY</b>    | 100-475-287 | S-beam         | M12X1.75         | 2 kN     |
| <b>BSS-XS-500KGY</b> | 100-475-286 | S-beam         | M12X1.75         | 5 kN     |
| <b>BSS-XS-1TY</b>    | 100-474-950 | S-beam         | M12X1.75         | 10 kN    |

### Low Profile Shear Beam Load Cells for Exceed Systems

- » Shear beam load cells for Exceed systems are designed for accuracy, stiffness, stability, and linearity
- » Measure moderately high axial loads
- » Low profile maximizes available test space
- » **Applications:** Ideal for low-force tension and compression testing of brittle metals and composites



### Specifications

| Model               | Part Number | Load Cell Type         | Mounting Threads | Capacity |
|---------------------|-------------|------------------------|------------------|----------|
| <b>DBSL-2TY</b>     | 100-474-953 | Low profile shear beam | M16X1.5          | 20 kN    |
| <b>DBSL-3TY</b>     | 100-474-954 | Low profile shear beam | M16X1.5          | 30 kN    |
| <b>DBSL-5TY</b>     | 100-474-955 | Low profile shear beam | M16X1.5          | 50 kN    |
| <b>DBSL-XS-5TY</b>  | 100-474-956 | Low profile shear beam | M24X1.5          | 50 kN    |
| <b>DBSL-XS-10TY</b> | 100-474-957 | Low profile shear beam | M24X1.5          | 100 kN   |
| <b>LPS.205Y</b>     | 100-467-455 | Low profile shear beam | M36X3            | 200 kN   |
| <b>LPS.305Y</b>     | 100-466-085 | Low profile shear beam | M36X3            | 300 kN   |
| <b>LPS.605Y</b>     | 058-503-302 | Low profile shear beam | M72X3            | 600 kN   |

# Tension Extensometers

## Contacting Extensometers

### AHX850 High Elongation Extensometers

- » AHX850 high elongation extensometer is compatible with MTS Criterion Universal Test Systems
- » High-resolution optical digital encoder eliminates noise, signal drift, and output changes
- » Balanced design with optimized arm and head weights
- » Swings away from test area when not in use
- » Meets or exceeds requirements for calibration according to ASTM E83 Class B1 and ISO 9513 Class 0.5 standards
- » The gripping force is applied using adjustable springs
- » **Applications:** Ideal for accurately measuring strain in specimens prone to large displacement while in tension such as polymers and other elastomers



AHX850

### Specifications

| Model                       | AHX850                                                                                                     |
|-----------------------------|------------------------------------------------------------------------------------------------------------|
| Part Number                 | 100-512-885                                                                                                |
| Frame Family                | Criterion                                                                                                  |
| Measuring Range             | 10 - 850 mm (0.4 - 33.4 in)                                                                                |
| Standard Gage Length        | 10 mm (0.4 in)<br>20 mm (0.8 in)<br>25 mm (1.0 in)<br>50 mm (2.0 in)<br>75 mm (2.95 in)<br>100 mm (3.9 in) |
| Maximum Specimen Dimensions | Width: 20 mm (0.8 in)<br>Thickness: 30 mm (1.2 in)                                                         |
| Relative Error              | 1%                                                                                                         |
| Resolution                  | 0.006 mm (0.0002 in)                                                                                       |
| Temperature Range           | 5° C (41° F) to 50° C (122° F)                                                                             |
| Height                      | 1025 mm (40.4 in)                                                                                          |
| Width                       | 90 mm (3.54 in)                                                                                            |
| Depth                       | 310 mm (12.2 in)                                                                                           |



# Tension Extensometers

## Contacting Extensometers

### LTX850 Long Travel Extensometers

- » High elongation extensometer compatible with MTS Exceed Universal Test Systems
- » Durable high strength aluminum structure
- » Dual independent digital input channels for upper and lower arms ensure accurate and reliable measurement
- » Changeable knife edges, adjustable gripping forces, and balance head and arm weight allow smooth following of material strain change with minimal stickiness
- » Meets or exceeds requirements for calibration according to ASTM E83 Class B1 and ISO 9513 Class 0.5 standards
- » The gripping force is applied using adjustable springs
- » **Applications:** Ideal for accurately measuring strain in specimens prone to large displacement while in tension such as polymers and other elastomer

### Specifications

| Model                       | LTX850                                                                                  |
|-----------------------------|-----------------------------------------------------------------------------------------|
| Part Number                 | 100-542-797                                                                             |
| Frame Family                | Exceed                                                                                  |
| Measuring Range             | 10 - 850 mm (0.4 - 33.4 in)                                                             |
| Standard Gage Length        | 10 mm (0.4 in)<br>20 mm (0.8 in)<br>25 mm (1.0 in)<br>50 mm (2.0 in)<br>75 mm (2.95 in) |
| Maximum Specimen Dimensions | Width: 20 mm (0.8 in)<br>Thickness: 30 mm (1.2 in)                                      |
| Relative Error              | 1%                                                                                      |
| Resolution                  | 0.006 mm (0.0002 in)                                                                    |
| Temperature Range           | 5° C (41° F) to 50° C (122° F)                                                          |
| Height                      | 1030 mm (40.6 in)                                                                       |
| Width                       | 90 mm (3.54 in)                                                                         |
| Depth                       | 255 mm (10 in)                                                                          |



LTX850



## Tension Extensometers

### Contacting Extensometers

#### FAX1352 Automatic Extensometers

- » FAX1352 automatic extensometer is compatible with MTS Criterion and Exceed Universal Test Systems
- » Designed for longevity
- » Optimized for high-volume testing of single gage length specimens
- » Rotational Mount allows the operator to quickly rotate the FAX out of the test area for easy access to the specimen
- » **Applications:** Ideal for axial strain measurement for tensile testing on Universal Test Systems

#### Specifications

| Model                       | FAX1352                                                                               |
|-----------------------------|---------------------------------------------------------------------------------------|
| Part Number                 | 100-530-550                                                                           |
| Frame Family                | Criterion & Exceed                                                                    |
| Measuring Range             | 0 - 80 mm (0 - 3.1 in)                                                                |
| Gage Length*                | 12.5 - 200 mm (0.5 - 7.9 in)                                                          |
| Thickness or Diameter Range | Flats: 0.2 - 40 mm<br>(0.0008 - 1.57 in)<br>Rounds: 0.2 - 40 mm<br>(0.0008 - 1.57 in) |
| Relative Error              | ±1%                                                                                   |
| Axial Resolution            | ≤0.2 µm                                                                               |
| Temperature Range           | 5° C (41° F) to 40° C (104° F)                                                        |
| Height                      | 530 mm (20.9 in)                                                                      |
| Width                       | 120 mm (4.7 in)                                                                       |
| Depth                       | 673 mm (26.5 in)                                                                      |
| Input Power                 | 100-240 VAC 50/60Hz 1.4A                                                              |

\* Recalibration is required whenever the specimen gage length is changed.



FAX1352



Rotational Mount

# Tension Extensometers

## Contacting Extensometers

### Series 635 Monotonic Tensile Extensometers

- » Series 635 extensometers are specially designed for popular monotonic axial tensile strain measurement. They are an economic choice, ideal for large volume QA/QC testing.
- » Features proprietary strain gaged elements made from special heat-treated alloy
- » Ground profile, dual-member flexure provides for very low activation force with excellent strength
- » True center-point bending resulting in low hysteresis and exceptionally accurate strain readings
- » Mechanical stops can be attached through specimen failure without damaging the unit
- » Zero-set pin enables accurate and consistent determination of the initial gage length
- » Not intended for immersion in water or other liquids
- » Hardened, replaceable knife edges for flat and round specimens are included
- » Patented MTS quick-attach springs for fast and easy specimen attachment are included
- » Standard 1.5 m (60 in) cable is included
- » Typical Linearity<sup>1</sup> is 0.08% of range
- » Accuracy<sup>2</sup> designed to meet ASTM E83 Class B1 and ISO 9513 Class 0.5 standards
- » Temperature Range is 4° C to 50° C (40° F to 120° F)
- » **Applications:** Axial tensile strain measurements for large volume QA/QC testing



### Specifications

| Model              | Part Number | Gage Length | Maximum Travel | Maximum Strain | Length (from knife edge to back of housing) | Height (from bottom to top) |
|--------------------|-------------|-------------|----------------|----------------|---------------------------------------------|-----------------------------|
| <b>635.25F-05</b>  | 057-863-506 | 25 mm       | + 5 mm         | 20%            | 77.5 mm (3.1 in)                            | 39.6 mm (1.1 in)            |
| <b>635.50F-05</b>  | 057-863-505 | 50 mm       | + 5 mm         | 10%            | 77.5 mm (3.1 in)                            | 59.2 mm (2.3 in)            |
| <b>635.50F-10</b>  | 057-863-504 | 50 mm       | + 10 mm        | 20%            | 77.5 mm (3.1 in)                            | 61.5 mm (2.4 in)            |
| <b>635.50F-25</b>  | 057-863-503 | 50 mm       | + 25 mm        | 50%            | 153.7 mm (6.1 in)                           | 69.1 mm (2.7 in)            |
| <b>635.100F-10</b> | 057-863-502 | 100 mm      | + 10 mm        | 10%            | 77.5 mm (3.1 in)                            | 111.8 mm (4.4 in)           |
| <b>635.100F-25</b> | 057-863-501 | 100 mm      | + 25 mm        | 25%            | 153.7 mm (6.1 in)                           | 119.1 mm (4.7 in)           |

Notes:

<sup>1</sup> Linearity stated is for ascending data and is the deviation from best fit straight line thru zero expressed as a percent of full scale.

<sup>2</sup> Calibrations are separate. These extensometers leave the factory with a quality validation and verification by sampling three measurement points to validate performance. The 635 series extensometers are intended to meet ASTM class B-1 and ISO class 0,5.

## Environmental Simulation

### Chambers

#### MTS Advantage Environmental Chambers

- » MTS Advantage environmental chambers increase range of temperatures available for materials testing
- » Enables testing at a constant temperature with very little gradient across the specimen
- » Compatible with video or laser extensometers
- » Optional heated window available
- » **Applications:** Materials testing at controlled temperatures for research, quality control and production testing of elastomeric components, tire cords, plastics, composites, laminates, etc.



AEC 10x10x32

#### Specifications

| Model                     | AEC 10x10x24                         | AEC 10x10x32                         | AEC 14x17x24                         | AEC 14x17x32                         |
|---------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>        | Configurable                         | Configurable                         | Configurable                         | Configurable                         |
| <b>Temperature Rating</b> | -129° C (-200° F) to 316° C (600° F) | -129° C (-200° F) to 316° C (600° F) | -129° C (-200° F) to 316° C (600° F) | -129° C (-200° F) to 316° C (600° F) |
| <b>Internal Width</b>     | 254 mm (10 in)                       | 254 mm (10 in)                       | 356 mm (14 in)                       | 356 mm (14 in)                       |
| <b>Internal Depth</b>     | 254 mm (10 in)                       | 254 mm (10 in)                       | 432 mm (17 in)                       | 432 mm (17 in)                       |
| <b>Internal Height</b>    | 610 mm (24 in)                       | 813 mm (32 in)                       | 610 mm (24 in)                       | 813 mm (32 in)                       |
| <b>External Width</b>     | 406 mm (16 in)                       | 406 mm (16 in)                       | 508 mm (20 in)                       | 508 mm (20 in)                       |
| <b>External Depth</b>     | 737 mm (29 in)                       | 737 mm (29 in)                       | 914 mm (36 in)                       | 914 mm (36 in)                       |
| <b>External Height</b>    | 762 mm (30 in)                       | 965 mm (38 in)                       | 762 mm (30 in)                       | 965 mm (38 in)                       |

# Environmental Simulation

## Furnaces

### Model 653 Furnaces

- » MTS Model 653 furnaces incorporate the MTS Model 409.83 temperature controller to provide high-temperature testing environments
- » Capable of achieving temperatures up to 1000° C (1832° F) in validated testing conditions
- » Single or multiple zone heating
- » Clamshell design streamlines test setup, furnace alignment, and specimen changeover
- » Silicon carbide heating elements and alumina fiber insulation system for low heat loss and long life
- » Multiple furnace heights to accommodate diverse test requirements
- » Mounting bracket for a variety of MTS load frames is included
- » Designed to accommodate MTS high-temperature axial extensometers
- » Multiple mounting options – on included furnace mounting bracket or optional stand for floor or table
- » Compact, ergonomic design
- » Multiple level, self-tuning PID control
- » SCR power relays included
- » Digital communications available
- » **Applications:** Ideal for high-temperatures tension and compression testing of metals, composites, ceramics, and a wide variety of materials



\* Nominal temperatures may vary depending on specimen geometry and material. 1400° C is achieved in a non-testing environment.

\*\* Supports testing to ASTM E606-04e1, BSI 7270, JIS Z2279, AFNOR A03-403 or ISO 12106 requirements.

Note: When ordering, please indicate voltage requirements and provide necessary load frame dimensions in order to determine system integration requirements.

### Specifications

| Model                             | 653.01                               | 653.02                               | 653.03                               | 653.04**                             |
|-----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Part Number</b>                | Configurable                         | Configurable                         | Configurable                         | Configurable                         |
| <b>Temperature Rating*</b>        | 200° C (392° F) to 1000° C (1832° F) | 200° C (392° F) to 1000° C (1832° F) | 200° C (392° F) to 1000° C (1832° F) | 200° C (392° F) to 1000° C (1832° F) |
| <b>Overall Height</b>             | 55 mm (2.2 in)                       | 85 mm (3.3 in)                       | 126 mm (5 in)                        | 220 mm (6.7 in)                      |
| <b>Hot Zone Height</b>            | 19 mm (0.75 in)                      | 50 mm (1.97 in)                      | 90 mm (3.54 in)                      | 185 mm (7.28 in)                     |
| <b>Hot Zone Width &amp; Depth</b> | 50 x 50 mm<br>(1.97 x 1.97 in)       | 50 x 50 mm<br>(1.97 x 1.97 in)       | 62.5 x 62.5 mm<br>(2.46 x 2.46 in)   | 62.5 x 62.5 mm<br>(2.46 x 2.46 in)   |
| <b>Number of Zones</b>            | 1                                    | 2                                    | 2                                    | 3                                    |

## Environmental Simulation

### Extension Rods – Chambers

#### MTS EM Extend Kits

- » MTS EM Extend Kits include a variety of extension rods to enhance testing flexibility and reduce test setup time.
- » All extension rods have ports for water cooling
- » Stainless steel construction minimizes heat transfer
- » Lightweight design minimizes tare weight
- » Tight tolerances ensure angular and concentric alignment are retained
- » Highly configurable to test various size specimens. Compression platens are usually low profile and will need more extension lengths. Pneumatic grips take up more space and will require fewer lengths
- » Type C, D & E kits consists of five different extension lengths that can be configured into 23 different length combinations
- » Upper extension rod can be adjusted in increments providing multiple pin-to-pin dimensions
- » Preloaded joints
- » **Applications:** Apply tension and compression in an environmental chamber to test low and high profile accessories or short and tall specimens



Type "C"



Type "D"

Load extension kits are packaged in a protective case.  
From left to right, the lengths are denoted as L1 through L5.

#### Specifications

| Model                     | EME202                                         | EME155                                         | EME305                                         |
|---------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <b>Part Number</b>        | 100-151-425                                    | 100-150-815                                    | 100-310-560                                    |
| <b>Type</b>               | Stainless Steel Water Cooled Extension Rod Kit | Stainless Steel Water Cooled Extension Rod Kit | Stainless Steel Water Cooled Extension Rod Kit |
| <b>Force Capacity</b>     | 0.2 kN (45 lbs)                                | 150 kN (33,700 lbs)                            | 300 kN (67,440 lbs)                            |
| <b>Temperature Rating</b> | -130° C (-200° F) to 315° C (600° F)           | -130° C (-200° F) to 315° C (600° F)           | -130° C (-200° F) to 315° C (600° F)           |
| <b>Attachment Type</b>    | C                                              | D                                              | E                                              |

Note: Optional Water Cooling Kit - 57975506.

## Environmental Simulation

### Extension Rods – Furnaces

#### MTS Fundamental Extension Rods

- » Affordable extension rods designed for high-temperature environments
- » All extension rods have water cooling ports
- » Special alloy enables high-temperature testing
- » Specimen interface can be changed while using the extension rod to reduce test setup time
- » **Applications:** Ideal for high-temperature tension and compression testing



#### Specifications

| Model                             | FHA000                                               | FHA001                                               |
|-----------------------------------|------------------------------------------------------|------------------------------------------------------|
| <b>Part Number</b>                | 100-231-867                                          | 100-277-341                                          |
| <b>Type</b>                       | High Temperature Alloy<br>Water Cooled Extension Rod | High Temperature Alloy<br>Water Cooled Extension Rod |
| <b>Force Capacity</b>             | 80 kN (18,000 lbf)*                                  | 80 kN (18,000 lbf)*                                  |
| <b>Temperature Rating</b>         | 0° C (0° F) to 1050° C (0 - 1922° F)                 | 0° C (0° F) to 1050° C (0 - 1922° F)                 |
| <b>Attachment Type</b>            | D                                                    | E                                                    |
| <b>Extension Rod Length</b>       | 364 mm (14.3 in)                                     | 399 mm (15.7 in)                                     |
| <b>Upper Extension Rod Weight</b> | 2.9 kg (6.5 lbs)                                     | 5 kg (11 lbs)                                        |

\* Force capacity at room temp, consult MTS Application Engineer for maximum force capacities at elevated temperatures.

#### Optional Specimen Interface Furnace Extension Rods

| Model         | Part Number | Profile  | Height         | Upper Extension Rod Weight | Temperature Range                    | Specimen Range        |
|---------------|-------------|----------|----------------|----------------------------|--------------------------------------|-----------------------|
| <b>FHA110</b> | 100-231-868 | Threaded | 80 mm (3.1 in) | 0.46 kg (1 lbs)            | 0° C (0° F) to 1050° C (0 - 1922° F) | M16 x 2               |
| <b>FHA120</b> | 100-231-869 | Threaded | 98 mm (3.8 in) | 0.58 kg (1.3 lbs)          | 0° C (0° F) to 1050° C (0 - 1922° F) | M12 x 1.75            |
| <b>FHA210</b> | 100-231-870 | Flat     | 68 mm (2.7 in) | 0.39 kg (0.9 lbs)          | 0° C (0° F) to 1050° C (0 - 1922° F) | 1-4 mm (0.04-0.16 in) |
| <b>FHA220</b> | 100-231-871 | Flat     | 83 mm (3.3 in) | 0.74 kg (1.6 lbs)          | 0° C (0° F) to 1050° C (0 - 1922° F) | 4-8 mm (0.16-0.31 in) |

## Spares Kits

Same Kit for Extension Length Version

### Specifications

| Model            | Part Number | Description                                                                    |
|------------------|-------------|--------------------------------------------------------------------------------|
| <b>C41.103Y</b>  | 100-529-712 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C42.503Y</b>  | 100-530-555 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C43.104Y</b>  | 100-530-558 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C43.304Y</b>  | 100-530-559 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C43.504Y</b>  | 100-530-560 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C44.304Y</b>  | 100-530-562 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C45.504Y</b>  | 100-530-563 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C45.504WY</b> | 100-530-564 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C45.105Y</b>  | 100-530-565 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C45.305Y</b>  | 100-530-566 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>C45.605Y</b>  | 100-530-567 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |

*Note: Y on model number indicates Criterion load frame with ICE controller.*

### Specifications

| Model          | Part Number | Description                                                                    |
|----------------|-------------|--------------------------------------------------------------------------------|
| <b>E42.503</b> | 100-303-303 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E43.104</b> | 100-303-304 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E43.504</b> | 100-367-234 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E44.304</b> | 100-303-305 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E45.105</b> | 100-303-306 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E45.305</b> | 100-303-307 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |
| <b>E45.605</b> | 100-303-308 | This kit includes certain switches, bellows, all belts, clevis pins and tools. |

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