# HTS Leads Installation Reports

Box "A"

FERMILAB
Technical Division

# Installation of the LHC HTS Current Leads

## Lead: DFLX 19

Signed Wayne E. Job Date 4-15-05

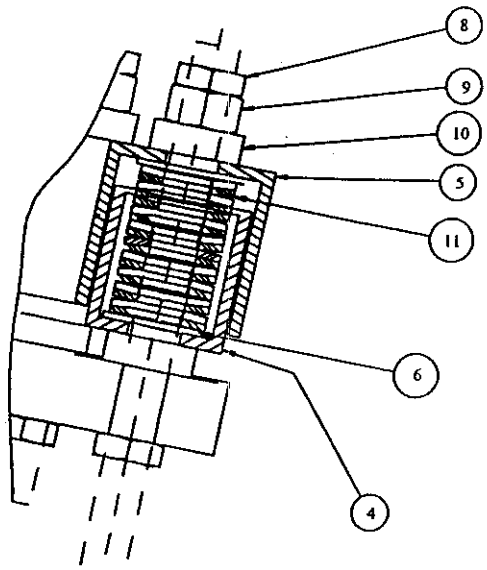


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.75 B 16.08 C ~~14.40~~ 16.15 D 16.08 E 16.18 F 15.57

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.95 B 14.28 C 14.35 D 14.28 E 14.38 F 13.77

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C _____ D _____ E ✓ F ✓

A ✓ B ✓ C _____ D _____ E ✓ F _____

A _____ B _____ C _____ D _____ E _____ F _____

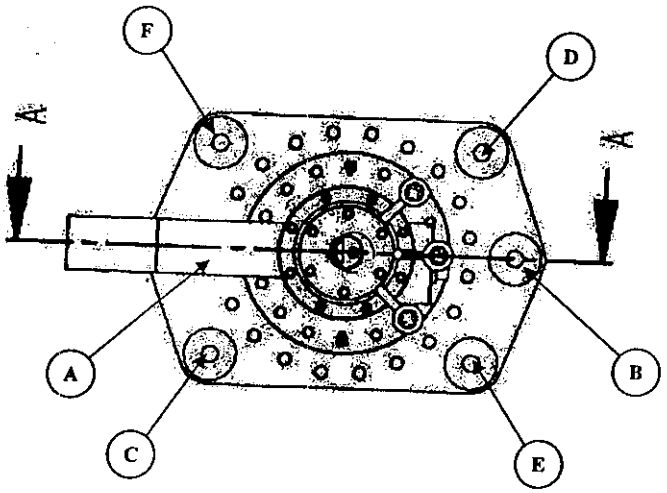


**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.02 B 14.35 C 14.50 D 14.15 E 14.50 F 14.02

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 10

Signed Wayne E. Johnson Date 4-15-05

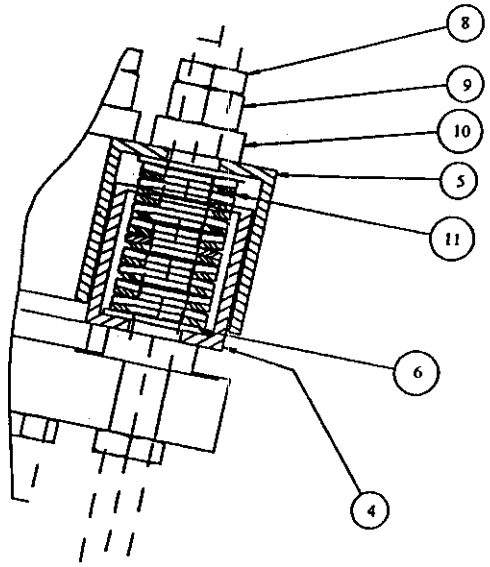


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.90 B 15.63 C 16.02 D 15.47 E 15.86 F 15.79

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.10 B 13.83 C 14.22 D 13.67 E 14.06 F 13.99

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ____ C ____ D ✓ E ✓ F ✓

A ____ B ____ C ____ D ____ E ____ F ____

A ____ B ____ C ____ D ____ E ____ F ____

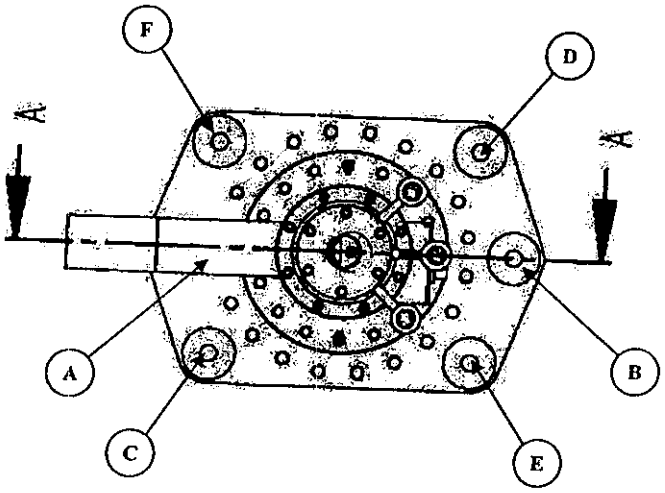


Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.18 B 14.23 C 14.18 D 13.87 E 14.09 F 14.13

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 30

Signed Wayne P. John Date 4-15-05

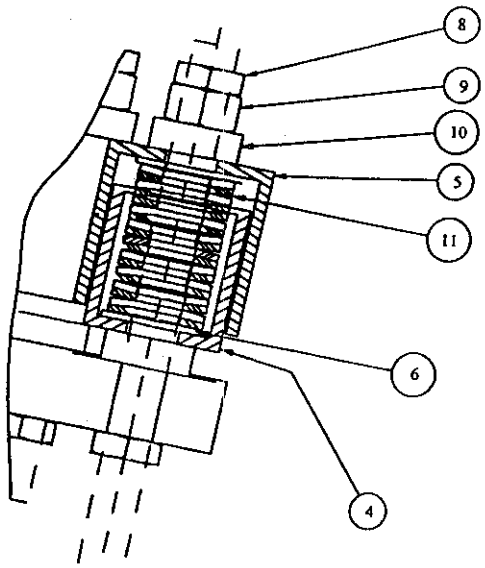


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.67 B 15.39 C 15.68 D 15.64 E 15.95 F 15.49

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.87 B 13.59 C 13.88 D 13.84 E 14.15 F 13.69

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A _____ B _____ C _____ D _____ E _____ F _____

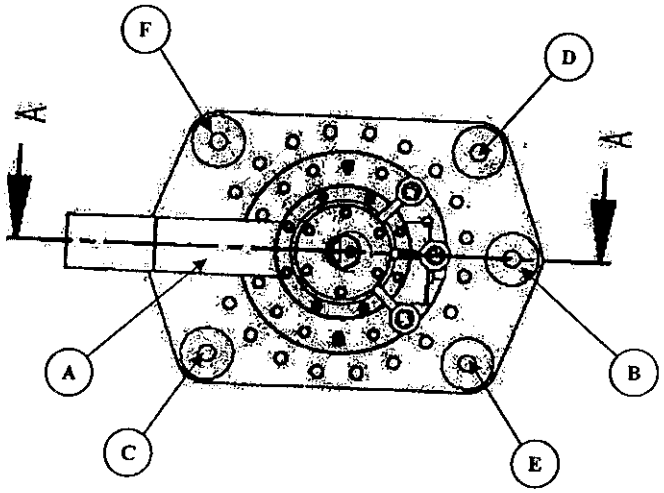


**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.95 B 13.54 C 14.09 D 13.79 E 14.12 F 13.90

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 27

Signed Wayne E. John Date 4-15-05

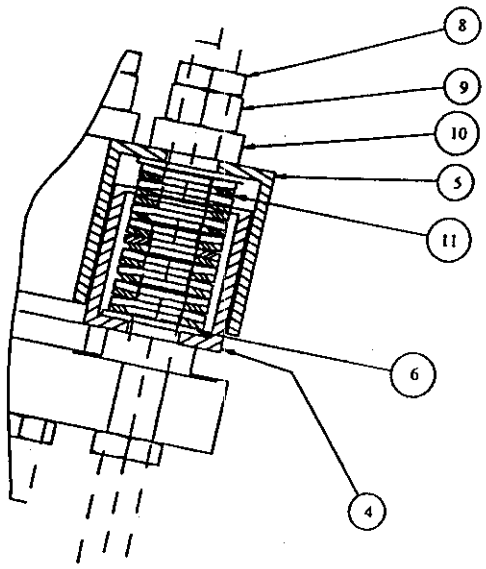


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.66 B 14.44 C 15.68 D 15.82 E 15.51 F 15.96

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.86 B 12.64 C 13.88 D 14.02 E 13.71 F 14.16

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ____ C ✓ D ____ E ✓ F ____

A ____ B ____ C ____ D ____ E ____ F ____

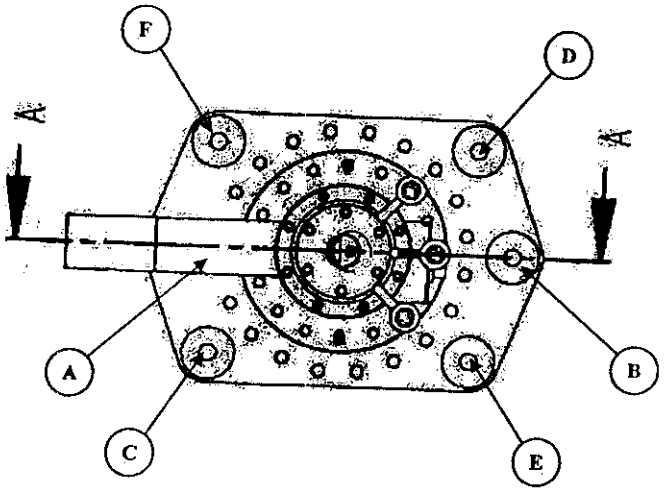


**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.67 B 13.53 C 13.31 D 13.95 E 13.66 F 14.29

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 27

Signed Mike Geringer Date 6/8/05

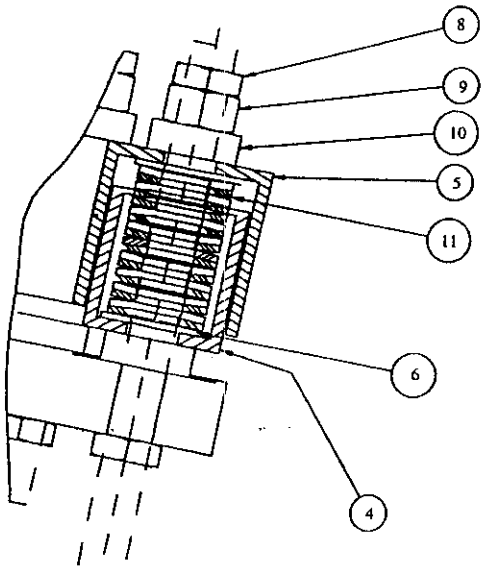


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 16.38 B 16.15 C 15.68 D 15.95 E 15.64 F 16.03

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.58 B 14.35 C 13.88 D 14.15 E 13.84 F 14.23

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A _____ B _____ C _____ D _____ E _____ F _____

A _____ B _____ C _____ D _____ E _____ F _____

A _____ B _____ C _____ D _____ E _____ F _____

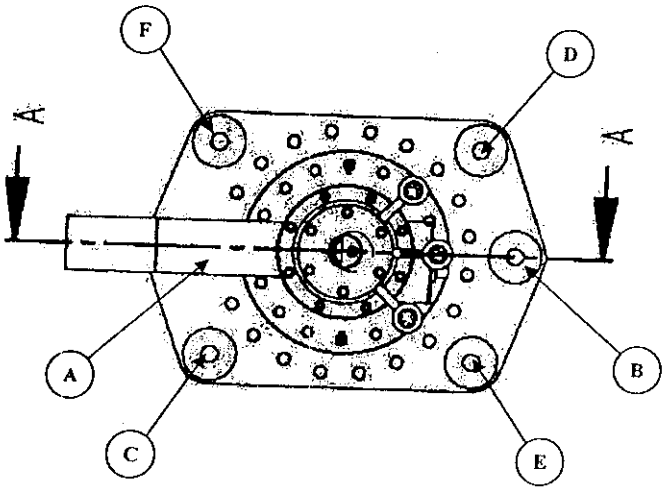


Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.58 B 14.39 C 13.88 D 14.11 E 13.82 F 14.21

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 19

Signed Mike Lamm Date 6/8/05

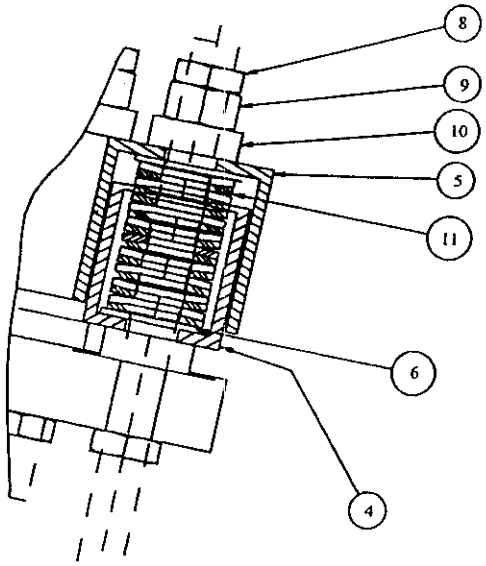


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.44 B 15.94 C 15.61 D 15.50 E 16.10 F 15.97

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.64 B 14.14 C 13.81 D 13.70 E 14.30 F 14.17

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A _____ B _____ C _____ D _____ E _____ F _____

A _____ B _____ C _____ D _____ E _____ F _____

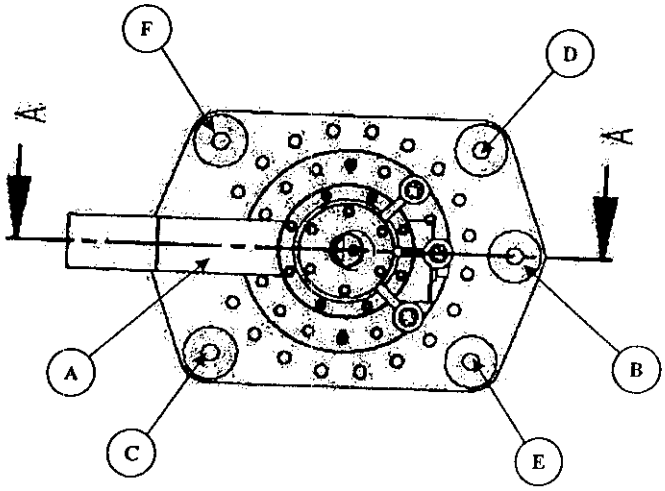


**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.63 B 14.15 C 13.79 D 13.71 E 14.30 F 14.15

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 10

Signed _____ Date 6/8/05

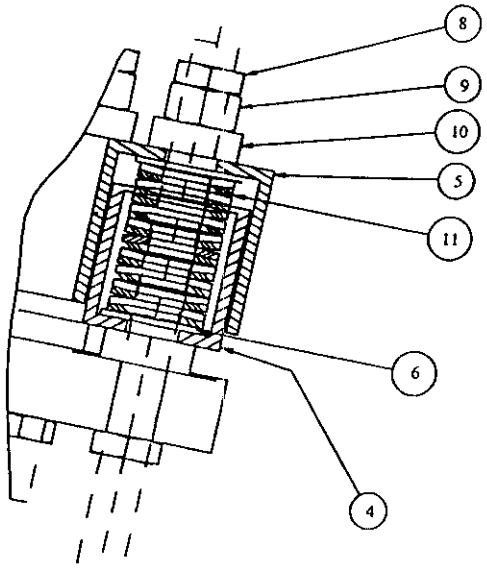


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.81 B 15.35 C 16.06 D 15.28 E 15.97 F 15.59

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 14.01 B 13.55 C 14.26 D 13.48 E 14.17 F 13.79

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A _____ B _____ C _____ D _____ E _____ F _____

A _____ B _____ C _____ D _____ E _____ F _____

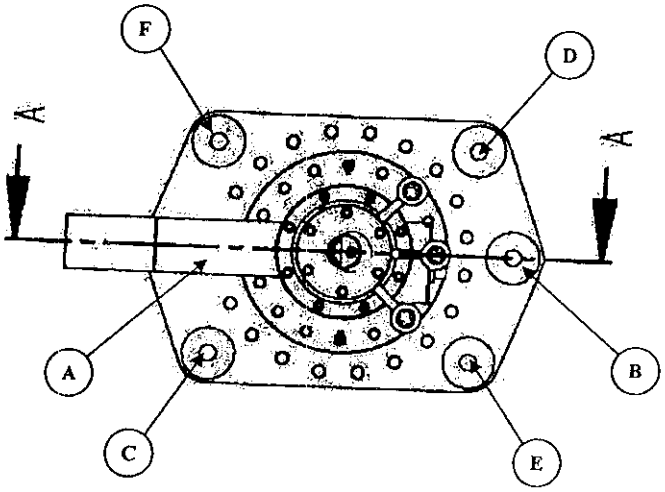


**Figure 1.32.2** The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 14.02 B 13.56 C 14.23 D 13.46 E 14.17 F 13.80

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.

Box "A"

**FERMILAB**
**Technical Division**

# Installation of the LHC HTS Current Leads

## Lead: DFLX 30

Signed Mike Jenning Date 6/8/05

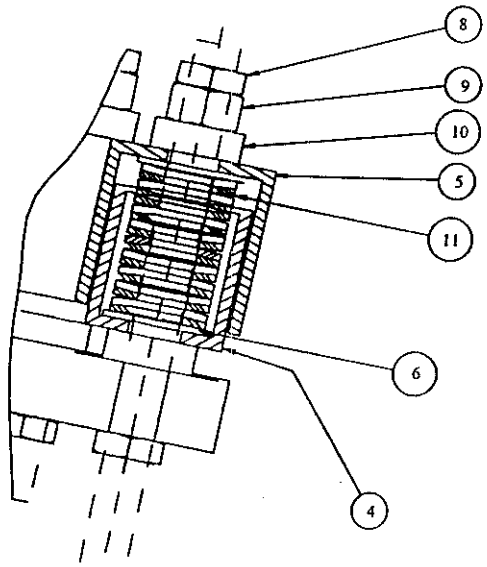


**Figure 1.31b** An installed Belleville washer assembly.

**1.29** Tighten the 6 Belleville washer assemblies to apply load to the PEEK seal.

**1.29.1** Back down the tensioning rod nuts used in Step 1.25 so they are about 5 mm below the power lead flange.

**1.29.2** Tighten the 6 loading nuts finger-tight. With adjustable parallels, measure and record the gap 'y' indicated in Figure 1.31a between Item 5 (Belleville washer holder upper half) and the power lead top flange at the 6 locations specified in Figure 1.32.2. Units are mm.

A 15.25 B 15.53 C 15.43 D 15.74 E 15.86 F 15.76

**1.29.3** For each of the six studs: remove the adjustable parallel, adjust it for 1.8 mm of compression, and return the adjustable parallel into position under the Belleville washer holder. Record the adjusted heights of the adjustable parallels. Units are mm.

A 13.45 B 13.73 C 13.63 D 13.94 E 14.06 F 13.93

**1.29.4** Using the sequence A through F in Figure 1.32.2, sequentially tighten the loading nuts ¼ turn until the total compression is 1.8 mm at each of the six locations. As each loading nut is tightened ¼ turn, check off the appropriate line.

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A ✓ B ✓ C ✓ D ✓ E ✓ F ✓

A _____ B _____ C _____ D _____ E _____ F _____

A _____ B _____ C _____ D _____ E _____ F _____

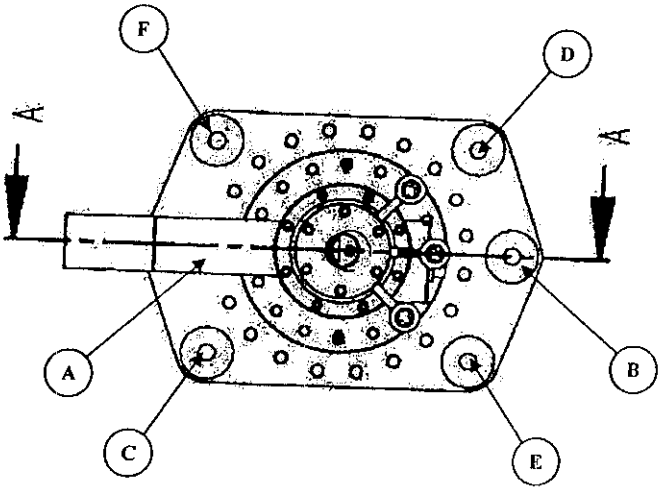


Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

**1.29.5** Remove the adjustable parallels from under each Belleville washer assembly, then replace them and measure the final gaps 'y' in Figure 1.31a. Units are mm.

A 13.46 B 13.73 C 13.62 D 13.95 E 14.05 F 13.92

**1.29.6** Attach a Conflat flange with a pressure gauge and a fill valve to the gas outlet port. Pressurize to 10 psig. The seal is acceptable if the pressure loss is less than 1 psi after 2 minutes.

**1.30** Reduce compression of Belleville washer assemblies.

**1.30.1** Remove the Teflon centering ring from the installed power lead.

**1.30.2** Back off the loading nuts sequentially to reduce the Belleville compression to 0.75 mm (0.030 in).

**1.31** Tighten down the jam nuts to secure the loading nuts on the installed Belleville washer assemblies.