HTS Leads Installation Reports

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 21

Signed Wayne E. John Date 2-4-05

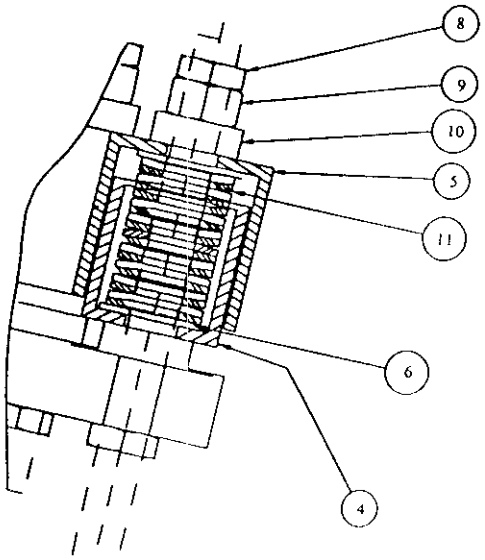

Figure 1.31b An installed Belleville washer assembly.

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 14.39 B 15.80 C 15.64 D 15.83 E 15.98 F 15.78

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 12.59 B 14.00 C 13.84 D 14.03 E 14.18 F 13.98

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 ____

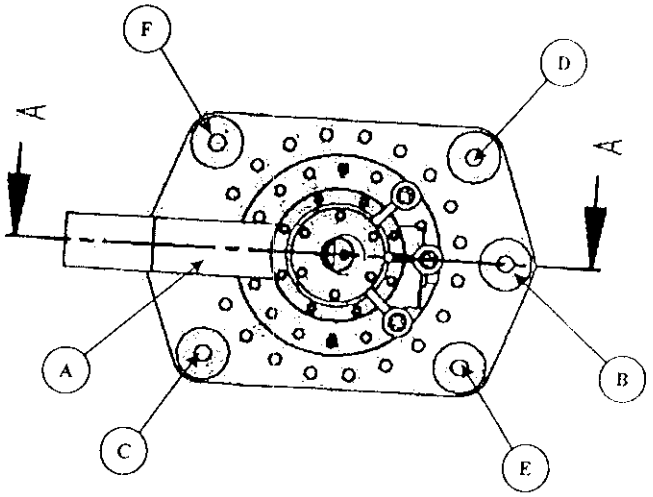

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 13.21 B 14.02 C 13.54 D 14.07 E 14.48 F 14.49

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 21

Box "E"

Signed Wayne E. John Date 3-23-05

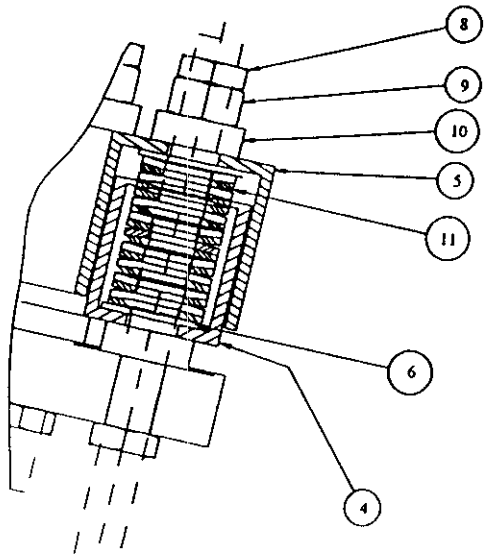

Figure 1.31b An installed Belleville washer assembly.

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 13.95 B 15.71 C 16.02 D 15.50 E 16.27 F 15.64

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 12.15 B 13.91 C 14.22 D 13.70 E 14.47 F 13.84

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 ____

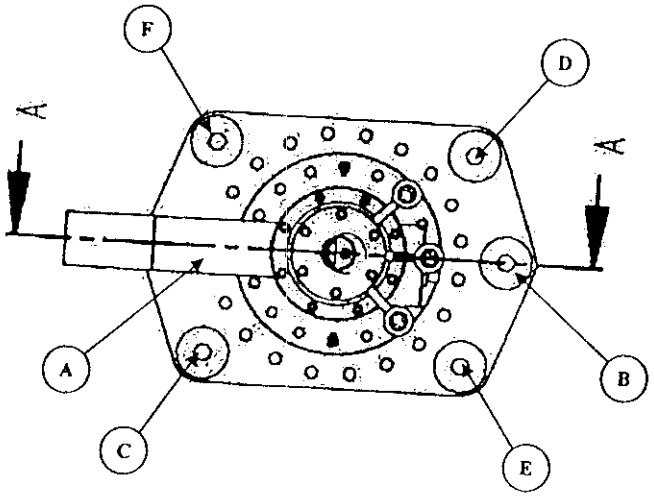

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 12.14 B 13.97 C 14.09 D 13.71 E 14.44 F 14.61

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 22

Signed Wayne E. Johnson Date 2-7-05

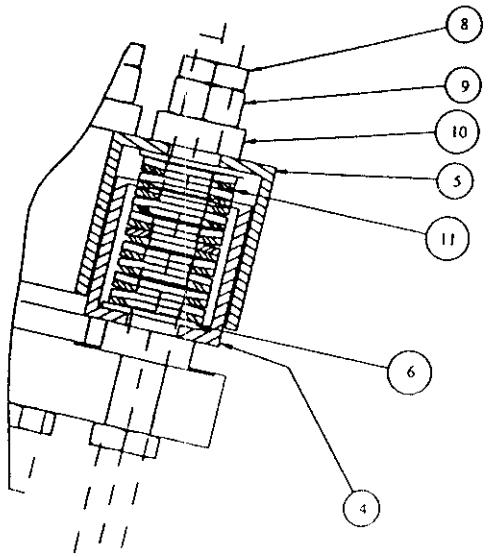

Figure 1.31b An installed Belleville washer assembly.

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 15.56 B 16.16 C 15.27 D 15.75 E 15.88 F 15.65

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 13.76 B 14.36 C 13.47 D 13.95 E 14.08 F 13.85

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 ____

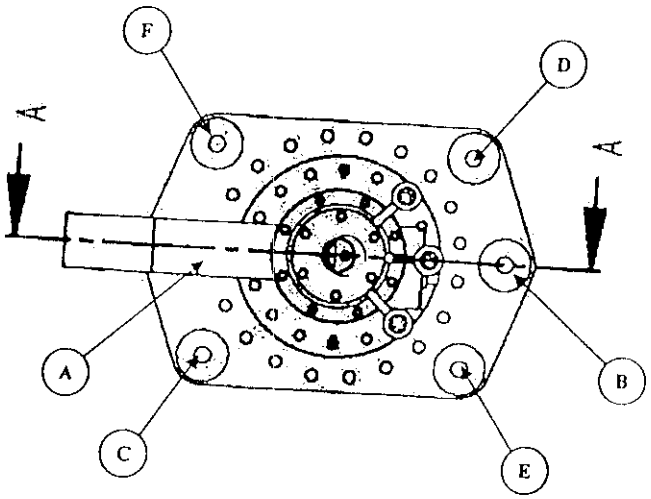

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 14.17 B 14.22 C 13.86 D 14.29 E 14.14 F 14.28

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 22

Box "E"

Signed Wayne E. John Date 3-23-05

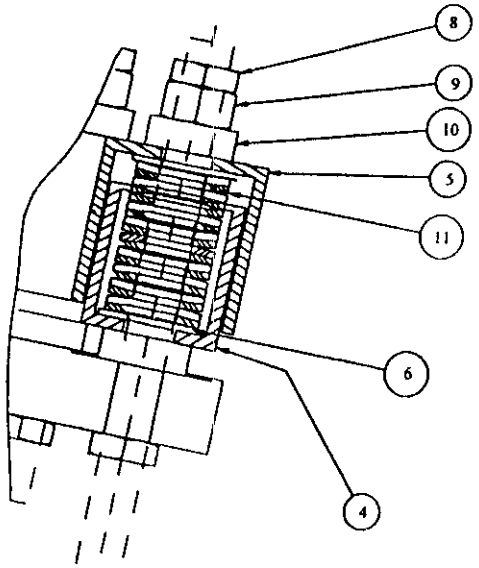

Figure 1.31b An installed Belleville washer assembly.

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 15.55 B 15.67 C 15.80 D 15.50 E 15.81 F 15.72

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 13.75 B 13.87 C 14.00 D 13.70 E 14.01 F 13.92

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 ____

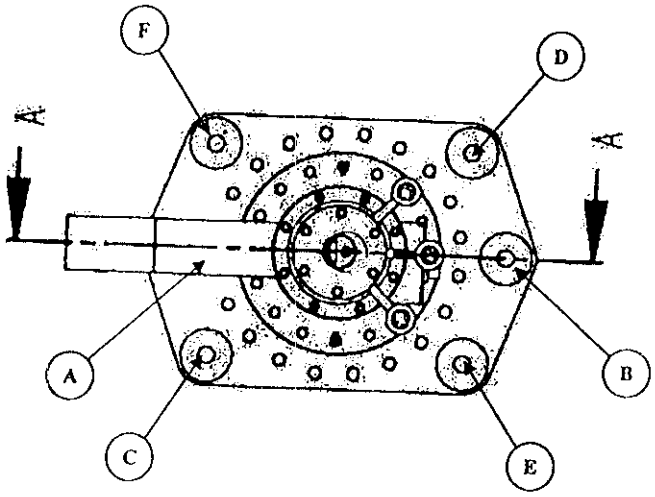

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 13.79 B 14.16 C 13.97 D 13.68 E 14.09 F 13.93

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 23

Signed Wayne E. Gabella Date 2-4-05

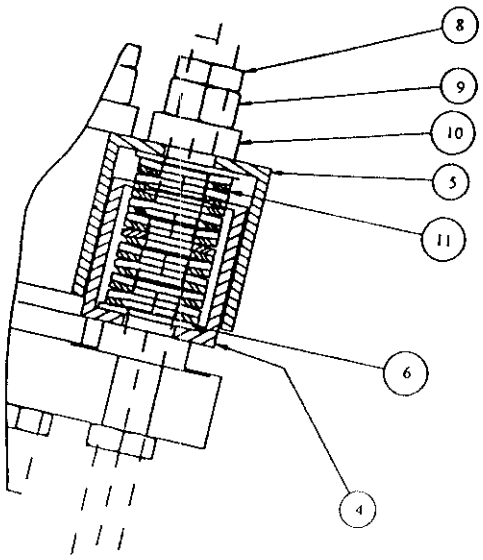

Figure 1.31b An installed Belleville washer assembly.

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 15.98 B 15.74 C 15.39 D 15.58 E 15.46 F 15.82

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 14.18 B 13.94 C 13.59 D 13.78 E 13.66 F 14.02

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 ___

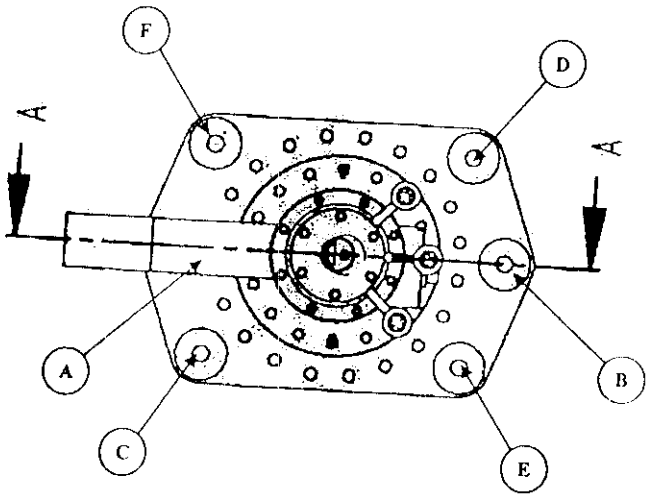

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 14.33 B 14.36 C 14.46 D 13.91 E 13.52 F 14.06

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 23

Box "E"

Signed Wayne S. John Date 3-23-05

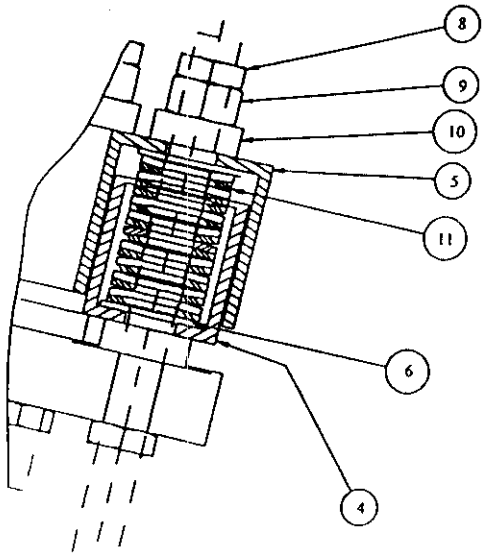

Figure 1.31b An installed Belleville washer assembly.

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 15.48 B 15.73 C 15.20 D 15.70 E 15.17 F 16.02

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 13.68 B 13.93 C 13.40 D 13.90 E 13.37 F 14.22

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 ____

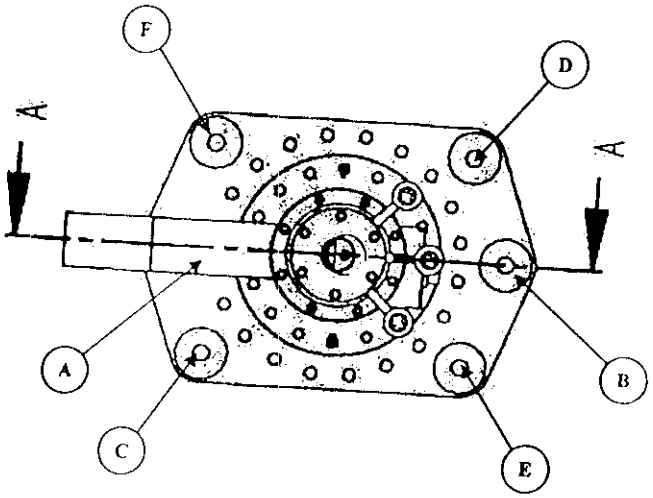

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 13.70 B 14.01 C 12.95 D 13.80 E 13.44 F 14.33

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 24

SPECIAL GASKET
FOR KNIFE EDGE

Signed Wayne E. Job Date 2-4-05

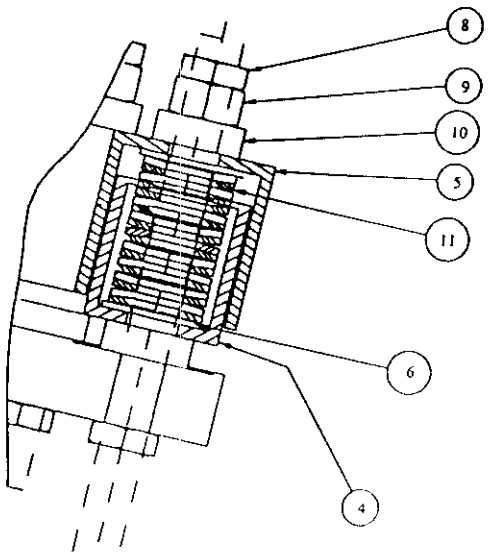

Figure 1.31b An installed Belleville washer assembly.

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 15.50 C 15.95 D 15.40 E 15.72 F 15.65

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 13.70 C 14.15 D 13.60 E 13.92 F 13.85

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 ____

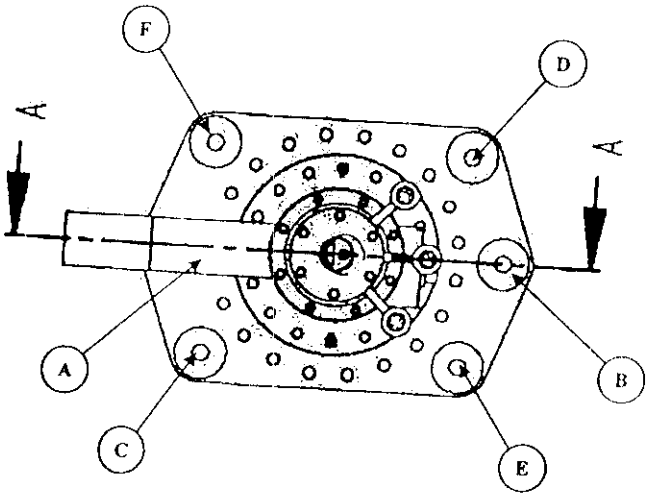

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 14.08 B 14.40 C 14.49 D 14.51 E 14.83 F 14.92

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.

FERMILAB
Technical Division

Installation of the LHC HTS Current Leads

Lead: DFLX 24

Box "E"

Signed Wayne E. John Date 3-23-05

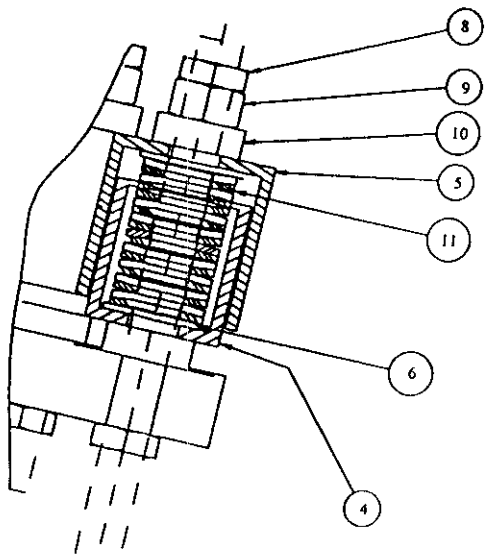

Figure 1.31b An installed Belleville washer assembly.

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 15.84 B 15.67 C 15.16 D 15.39 E 15.51 F 15.64

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 14.04 B 13.87 C 13.36 D 13.59 E 13.71 F 13.84

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 ____

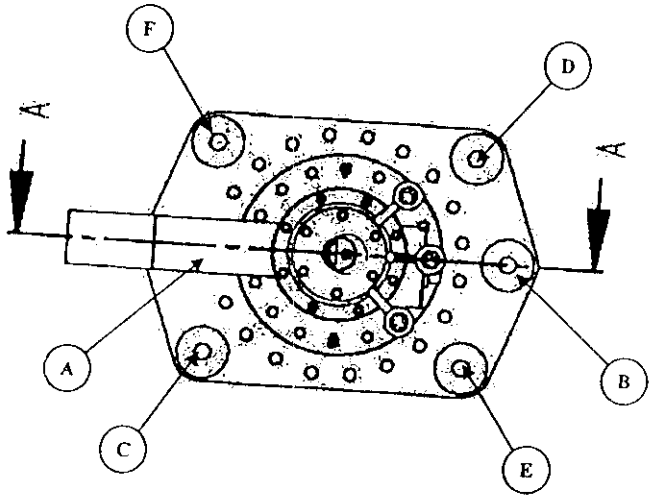

Figure 1.32.2 The specified sequence for tightening the Belleville washer assemblies.

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 14.54 B 13.89 C 13.6 D 13.61 E 13.61 F 13.88

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.