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**BOMBARDIER**
Toronto (de Havilland)
**PROPRIETARY INFORMATION**

# PPS 13.22

**PRODUCTION PROCESS STANDARD**

## Application of Fit-Up Forces

Issue 5
- This standard supersedes PPS 13.22, Issue 4.
- Vertical lines in the left hand margin indicate changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

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|---|---|---|
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| | Production Process Standards (PPS) | |
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| | Quality | |

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**Tables**

## 1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the application of fit-up forces for assembly purposes **only**. Refer to specific drawing notation for any allowable force application for the purposes of verifying proper part configuration or straightening.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS must be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. **do not** supersede the procedure or requirements specified in this PPS. Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

## 2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Toronto (de Havilland) Environment, Health and Safety Department.

## 3 References

3.1 PPS 13.26 - General Subcontractor Provisions.

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 No materials specified herein.

### 4.2 Equipment

4.2.1 Calibrated equipment suitable for the parts in question which is capable of measuring and displaying the forces applied to the parts. The equipment must be capable of accurately measuring forces of between 1/4 and 5 pounds. For example:

- Force units (weights from 1/4 pound to 5 pounds).
- Calibrated spring scales complete with rubber head (see Figure 1). Ensure that the rubber head will not damage the parts when the force is applied.

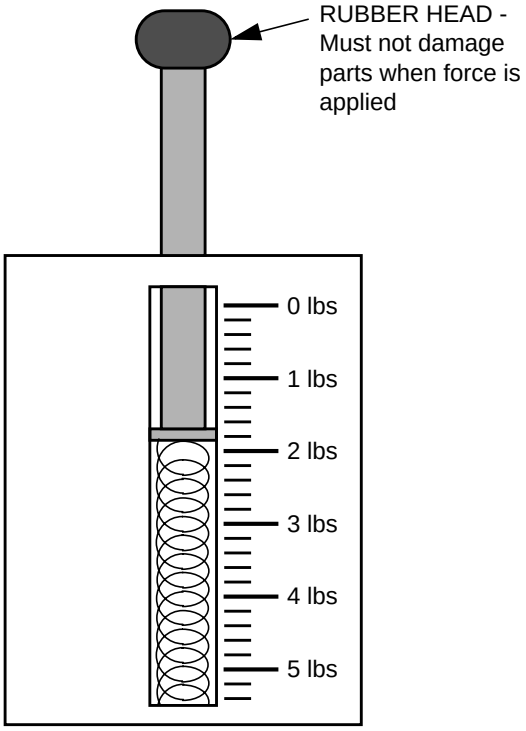


**FIGURE 1 - CALIBRATED SPRING SCALE**

## 5 Procedure

### 5.1 General

5.1.1 Application of the fit-up forces specified herein may only be applied to fit-up mating parts for assembly.

5.1.2 Unless the engineering drawing specifies a specific fit-up method, do not apply fit-up forces in an attempt to make a part conform to the process tooling.

5.1.3 If a specific fit-up method is specified on the engineering drawing, formed parts must conform to the relevant process tooling (i.e. surface plates, checking fixtures, dies, moulds, etc.) within the requirements specified on the engineering drawing without any other fit-up method being applied.

5.1.4 Unless the engineering drawing specifies alternate minimum fit requirements, there must not be a gap between mating surfaces after the application of fit-up forces.

### 5.2 Application of Localized Force

5.2.1 Refer to Table 1 for the amount of localized force that may be applied to the surface.

5.2.2 Apply force to the mating surfaces in as many locations as necessary, provided that the minimum spacing according to Table 1 is maintained. Use equipment suitable for the parts in question (see Equipment section, paragraph 4.2.1).

5.2.3 Take care when applying the force units to ensure that the part surface is not scratched or damaged.

**Table 1 - Application of Localized Force**

| MATERIAL THICKNESS | FORCE UNITS | MINIMUM SPACING |
|---|---|---|
| less than 0.045" | 1/4 lb | 1 1/2" |
| | 1/2 lb | 3" |
| | 1 lb | 6" |
| | 2 lbs | 12" |
| 0.045" or greater | 5/8 lb | 1 1/2" |
| | 1 1/4 lbs | 3" |
| | 2 1/2 lbs | 6" |
| | 5 lbs | 12" |

## 6 Requirements

6.1 Formed parts shall conform to the relevant process tooling within the requirements specified on the engineering drawing using the fit-up method specified on the engineering drawing.

6.2 If a specific fit-up method is not called out on the engineering drawing, formed parts shall conform to the process tooling within the requirements specified on the engineering drawing without having to apply any fit up forces.

6.3 Unless the engineering drawing specifies alternate minimum fit requirements, there shall not be a gap between mating surfaces after the application of fit-up forces.

6.4 The forces applied to the parts shall not exceed those listed in Table 1.

6.5 The part surfaces shall not be scratched or damaged by the application of fit up forces.

## 7 Safety Precautions

**7.1 Observe general shop safety precautions when performing the procedure specified herein.**

## 8 Personnel Requirements

8.1 Personnel responsible for the application of fit-up forces must have a good working knowledge of the procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.