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MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

Green Line Type 8 Friction Brake Static Test

Friction Brake Functionality: Service, Emergency & Track Brakes

GL8-TP-003

LINE: GREEN LINE

VEHICLE TYPE: Type 8

SYSTEM: BRAKES

ISSUED: 1/31/2018

REVISION: 0.2

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DESCRIPTION **PAGE #**

REVISION HISTORY

Revision Number	Revision Date	Revised sections	Description, Reason for changes
0.1	01/12/2018		Initial Draft Release
0.2	1/31/2018		Added Clarifications; "A-End" changed to "B-End" in 6.1.1; ">100s" changed to ">120s" in 5.1.4; Added Section 9. Added "(Socket 9/32)" to Low Pressure Switch Components.

1.0 PURPOSE:

This test procedure is used to statically test friction brake functionality, including service, emergency, and track brakes. The procedure is based on Breda static test procedure BOVS-17, but has been re-organized and modified to streamline the test process.

2.0 SCOPE:

This procedure is to be utilized after the brakes have been modified for any purpose. It will be used to ensure the reliaibility of the brake system for service use.

3.0 REFERENCE DOCUMENTS:

1. Breda Drawing R12.4.00.200, Sheet 38
2. Breda Drawing R12.4.00.200, Sheet 42
3. Breda Drawing R12.4.00.200, Sheet 96
4. Breda Drawing R12.4.00.675
5. Breda Drawing R12.4.00.676
6. Breda Procedure BOVS-17, *Friction Brake Test Procedure*

4.0 TOOLING AND EQUIPMENT:

The following tooling and equipment listed below are to be utilized to complete this qualification testing.

Table 1: Tooling & Equipment

QTY	Description
1	Multimeter
1	Laptop with Serial Link Cable and Bombardier PTU Software Release v2.0.8
4	Hydraulic Pressure Gauges, 0-3000 psi range, 50 psi gradations
1	Stopwatch with Lap Timer
	Standard Shop Tools

5.0 PRE-TEST OPERATION

5.1 Vehicle in STANDBY on one or both ends with 600V applied through the pantograph.

5.2 Propulsion cutout to ALL OUT on both ends.

6.0 B-TRUCK TEST

6.1 Supply Pressure

Step	Perform	Verify/Record	Acceptance Criteria
6.1.1	B-End Logic Rack: Connect Laptop to "P+B Logic" Serial Port Initialize PTU Software Set Watch Variables on PTU: BCP Actual, M1, M2, LWB	Record value of LWB	62.6 ± 6.5psi
6.1.2	Both Ends to LAYUP A-End Breaker Panel: Open 2Q14 (Track Brake Command), Wait 30 Seconds, Close 2Q14	Record HPCU Oil Level Record HPCU Serial Number	Between MIN and MAX N/A
6.1.3	B-Truck HPCU: Connect Pressure Gauges to TC0, TT1, and TT3	TC0 (Supply Pressure) TT1 (Service Pressure) TT3 (Emergency Pressure)	0 psi ± 25 psi 0 psi ± 25 psi 0 psi ± 25 psi
6.1.4	B-End to STANDBY	Record Time from STANDBY (HPCU Motor ON) to M1 = Normal (HPCU Motor OFF) Record TC0 when M1 = Normal Record Time from M1 = Normal (HPCU Motor OFF) to M1 = Low (HPCU Motor ON) ** If TC0 does not drop to 1740 ± 10% after 5 minutes, cycle COST to FSB until M1 = Low* Record TC0 when M1 = Low Record Time from M1 = Low (HPCU Motor ON) to M1 = Normal (HPCU Motor OFF) Record TC0 when M1 = Normal	N/A 2250 psi ± 10% >120s 1740 psi ± 10% N/A 2250 psi ± 10%

6.2 Layup Timer

Step	**Perform**	**Verify/Record**	**Acceptance Criteria**
6.2.1	B-End to LAYUP	TC0, 1 Minute after LAYUP	>1570 psi
6.2.2	A-End Breaker Panel: Open 2Q14	TC0, 30 Seconds after 2Q14 OPEN	0 psi ± 25 psi

Step	Perform	Verify/Record	Acceptance Criteria
6.2.3	A-End Breaker Panel: Close 2Q14 B-End to STANDBY	N/A	N/A

6.3 Manual Release and Slack Adjustors

Step	Perform	Check	Location
6.3.1	B-End to NEUTRAL, OPERATE B-End Switch Panel: 2S12 (Friction Bk. Cutout) to CUTOUT BYPASS	TT1 TT3 Axle 5 and 6 Brake Calipers	0 psi ± 25psi 0 psi ± 25psi Brakes Engaged
6.3.2	Manually Release Axle 5 and 6 Brake Calipers	Axle 5 and 6 Brake Calipers MTU Indication	Brakes Released MANUAL BRAKE RELEASE B
6.3.3	CLOSE all Doors B-End Switch Panel: 2S12 (Friction Bk. Cutout) to NORMAL B-End to FORWARD B-End to COAST, wait 10s, B-End to FSB, wait 3s, repeat 10x	Axle 5 and 6 Brake Calipers	Slack Adjustors Reset: Brakes Engaged in FSB, Released in COAST
6.3.4	B-End to NEUTRAL, OPERATE	N/A	N/A

6.4 Brake Pressure and Track Brake

Step	Perform	Verify/Record	Acceptance Criteria
6.4.1	B-End Press and Hold Track Brake Toggle	Track Brakes	Engaged
6.4.2	B-End Release Track Brake Toggle	Track Brakes	Released
6.4.3	B-End to NEUTRAL, STANDBY	**Record** TT1 **Record** TT3	0 psi ± 25 psi 0 psi ± 25 psi
6.4.4	B-End to NEUTRAL, OPERATE	**Record** TT1 **Record** BCP Actual **Record** TT3	1475 psi ± 10% Within 6% of TT1 0 psi ± 25 psi
6.4.5	B-End to FORWARD	**Record** TT1 **Record** BCP Actual **Record** TT3	1160 psi ± 10% Within 6% of TT1 >1570 psi
6.4.6	B-End to COAST	**Record** TT1 **Record** BCP Actual **Record** TT3	0 psi ± 25 psi Within 6% of TT1 >1570 psi
6.4.7	B-End to FSB+TB	**Record** TT1 **Record** TT3 Track Brakes	1160 psi ± 10% >1570 psi Engaged
6.4.8	B-End to EMERGENCY	**Record** TT1 **Record** TT3 Track Brakes	1475 psi ± 10% 0 psi ± 25 psi Engaged
6.4.9	B-End to FSB	**Record** TT1 **Record** TT3 Track Brakes	1160 psi ± 10% >1570 psi Released
6.4.10	Repeat Steps **Error! Reference source not found.** to **Error! Reference source not found.** with B-End in REVERSE	Same as **Error! Reference source not found.** to **Error! Reference source not found.**	Same as **Error! Reference source not found.** to **Error! Reference source not found.**

Step	Perform	Verify/Record	Acceptance Criteria
6.4.11	B-End to NEUTRAL, STANDBY	TT1 TT3	0 psi ± 25 psi 0 psi ± 25 psi

6.5 Low Pressure Switch

Step	Perform	Check	Location
6.5.1	B-End Relay Panel: Disconnect TB01-21 (21709) (Socket 9/32) B-End to FORWARD, OPERATE	N/A	N/A
6.5.2	B-End Alternate between COAST and FSB until M2 = LOW	**Record** TC0 when M2 = Low MTU Indication	1540psi ± 10% FRICTION BRAKE FAULT
6.5.3	B-End to NEUTRAL, OPERATE B-End Relay Panel: Reconnect TB01-21 (21709) Clear FRICTION BRAKE FAULT	Time from Clearing Fault to M2 = NORMAL Time from Clearing Fault to M1 = NORMAL	< 30 seconds < 2 minutes
6.5.4	B-End to NEUTRAL, STANDBY	N/A	N/A

6.6 Over Pressure Valve

Step	Perform	Check	Location
6.6.1	B-End Relay Panel: Hold 2K14 ON until TC0 Stops Increasing **(WARNING: TC0 MUST NOT EXCEED 2670 psi)**	**Record** Maximum TC0	2540 psi ± 70 psi

6.7 Brake Applied Pressure Switch and Brake Released Pressure Switch

Note: This section cannot be completed if the BAPS modification has been completed. Ignore it if the Mod has been completed.

Step	Perform	Check	Location
6.7.1	B-End to FORWARD, OPERATE B-End Relay Panel: Measure Voltage between TB1-26 (20516) and Ground B-End to COAST	N/A	N/A
6.7.2	Slowly Move B-End to FSB, Pause when +37V is Measured	**Record** TT1 MTU Indication	1100 psi ± 10% BRAKES APPLIED
6.7.3	Slowly Move B-End to COAST, Pause when +37V is Lost	**Record** TT1 MTU Indication	740 psi ± 100 psi BRAKES APPLIED
6.7.4	B-End to COAST	MTU Indication	BRAKES RELEASED
6.7.5	Slowly Move B-End to FSB, Pause when BCP Actual Begins to Register Pressure on the PTU	**Record** TT1 MTU Indication	N/A BRAKES APPLIED
6.7.6	B-End to NEUTRAL, LAYUP	N/A	N/A

7.0 C-TRUCK TEST

7.1 Supply Pressure

Step	**Perform**	**Check**	**Location**
7.1.1	B-End Logic Rack: Connect Laptop to "FB Logic" Serial Port Initialize PTU Software Set Watch Variables of PTU: BCP1 Actual, BCP2 Actual, M1, M2, LWC-A, LWC-B	**Record** values of LWC-A and LWC-B	LWC-A 52.2± 5.5 psi LWC-B 52.2± 5.5 psi

Step	Perform	Check	Location
7.1.2	Both Ends to LAYUP A-End Breaker Panel: Open 2Q14 (Track Brake Command), Wait 30 Seconds, Close 2Q14	HPCU Oil Level **Record** HPCU Serial Number	Between MIN and MAX N/A
7.1.3	C-Truck HPCU: Connect Pressure Gauges to TC0, TT1, TT2 and TT3	TC0 (Supply Pressure) TT1 (Service Pressure 1) TT2 (Service Pressure 2) TT3 (Emergency Pressure)	0 psi ± 25 psi 0 psi ± 25 psi 0 psi ± 25 psi 0 psi ± 25 psi
7.1.4	A-End to STANDBY	**Record** Time from STANDBY (HPCU Motor ON) to M1 = Normal (HPCU Motor OFF) **Record** TC0 when M1 = Normal **Record** Time from M1 = Normal (HPCU Motor OFF) to M1 = Low (HPCU Motor ON) ** If TC0 does not drop to 1740 ± 10% after 5 minutes, cycle COST to FSB until M1 = Low* **Record** TC0 when M1 = Low **Record** Time from M1 = Low (HPCU Motor ON) to M1 = Normal (HPCU Motor OFF) **Record** TC0 when M1 = Normal	N/A 2250 psi ± 10% >120s 1740 psi ± 10% N/A 2250 psi ± 10%

7.2 Layup Timer

Step	Perform	Verify/Record	Acceptance Criteria
7.2.1	A-End to LAYUP	• TC0, 1 Minute after LAYUP	• >1570 psi
7.2.2	A-End Breaker Panel: Open 2Q14	• TC0, 30 Seconds after 2Q14 OPEN	• 0 psi ± 25psi
7.2.3	A-End Breaker Panel: Close 2Q14 B-End to STANDBY	• N/A	• N/A

7.3 Manual Release and Slack Adjustors

Step	Perform	Verify/Record	Acceptance Criteria
7.3.1	A-End to NEUTRAL, OPERATE A-End Switch Panel: 2S13 (Friction Bk. Cutout) to CUTOUT BYPASS	• TT1 • TT2 • TT3 • Axle 3L, 4L, 3R, and 4R Brake Calipers	• 0 psi ± 25psi • 0 psi ± 25psi • 0 psi ± 25psi • Brakes Engaged
7.3.2	Manually Release Axle 3L, 4L, 3R, and 4R Brake Calipers	• Axle 3L, 4L, 3R, and 4R Brake Calipers • MTU Indication	• Brakes Released • MANUAL BRAKE RELEASE C
7.3.3	A-End Switch Panel: 2S13 (Friction Bk. Cutout) to NORMAL A-End to FORWARD A-End to COAST, wait 10s, A-End to FSB, wait 3s, repeat 10x	• Axle 3L, 4L, 3R, and 4R Brake Calipers	• Slack Adjustors Reset: Brakes Engaged in FSB, Released in COAST
7.3.4	A-End to NEUTRAL, OPERATE	• N/A	• N/A

7.4 Brake Pressures

Step	Perform	Verify/Record	Acceptance Criteria
7.4.1	A-End to NEUTRAL, STANDBY	Record TT1 Record TT2 Record TT3	0 psi ± 25 psi 0 psi ± 25 psi 0 psi ± 25 psi
7.4.2	A-End to NEUTRAL, OPERATE	Record TT1 Record TT2 Record BCP Actual 1 Record BCP Actual 2 Record TT3	562 psi ± 10% 562 psi ± 10% Within 6% of TT1 Within 6% of TT2 0 psi ± 25 psi

Step	Perform	Verify/Record	Acceptance Criteria
7.4.3	A-End to FORWARD	Record TT1 Record TT2 Record BCP Actual 1 Record BCP Actual 2 Record TT3	300 psi ± 10% 300 psi ± 10% Within 6% of TT1 Within 6% of TT2 >1570 psi
7.4.4	A-End to COAST	Record TT1 Record TT2 Record BCP Actual 1 Record BCP Actual 2 Record TT3	0 psi ± 25 psi 0 psi ± 25 psi Within 6% of TT1 Within 6% of TT2 >1570 psi
7.4.5	A-End to FSB+TB	Record TT1 Record TT2 Record TT3	300 psi ± 10% 300 psi ± 10% >1570 psi
7.4.6	A-End to EMERGENCY	Record TT1 Record TT2 Record TT3	562 psi ± 10% 562 psi ± 10% 0 psi ± 25 psi
7.4.7	A-End to FSB	Record TT1 Record TT2 Record TT3	300 psi ± 10% 300 psi ± 10% >1570 psi
7.4.8	Repeat Steps 0 to 0 with A-End in REVERSE	Same as 0 to 0	Same as 0 to 0
7.4.9	A-End to NEUTRAL, STANDBY	Record TT1 Record TT2 Record TT3	0 psi ± 25 psi 0 psi ± 25 psi 0 psi ± 25 psi

7.5 Low Pressure Switch

Step	Perform	Verify/Record	Acceptance Criteria
7.5.1	A-End Relay Panel: Disconnect TB02-51 (21508) (Socket 9/32) A-End to FORWARD, OPERATE	N/A	N/A
7.5.2	A-End Alternate between COAST and FSB until M2 = LOW	Record TC0 when M2 = Low MTU Indication	1540 psi ± 10% FRICTION BRAKE FAULT
7.5.3	A-End to NEUTRAL, OPERATE A-End Relay Panel: Reconnect TB02-51 (21508) Clear FRICTION BRAKE FAULT	Time from Clearing Fault to M2 = NORMAL Time from Clearing Fault to M1 = NORMAL	< 30 seconds < 2 minutes
7.5.4	A-End to NEUTRAL, STANDBY	N/A	N/A

7.6 Over Pressure Valve

Step	Perform	Verify/Record	Acceptance Criteria
7.6.1	A-End Relay Panel: Hold 2K21 ON until TC0 Stops Increasing (WARNING: TC0 MUST NOT EXCEED 2670 psi)	Record Maximum TC0	2540 psi ± 70 psi

7.7 Brake Applied Pressure Switch and Brake Released Pressure Switch

Note: This section cannot be completed if the BAPS modification has been completed. Ignore it if the Mod has been completed.

Step	Perform	Verify/Record	Acceptance Criteria
7.7.1	B-End Relay Panel: Connect Jumper from TB2-19 (70104) to TB01-26 (20516) A-End to FORWARD, OPERATE A-End Relay Panel: Measure Voltage between TB02-15 (20509) and Ground A-End to COAST	N/A	N/A
7.7.2	Slowly Move A-End to FSB, Pause when +37V is Measured	Record TT1 Record TT2 MTU Indication	130 psi ± 10% 130 psi ± 10% BRAKES APPLIED
7.7.3	Slowly Move A-End to COAST, Pause when +37V is Lost	Record TT1 Record TT2 MTU Indication	87 psi ± 10% 87 psi ± 10% BRAKES APPLIED
7.7.4	A-End to COAST	MTU Indication	BRAKES RELEASED
7.7.5	Slowly Move A-End to FSB, Pause when BCP1 Actual and BCP2 Actual Begin to Register Pressure on the PTU	Record TT1 Record TT2 MTU Indication	N/A N/A BRAKES APPLIED
7.7.6	A-End to NEUTRAL, STANDBY B-End Relay Panel: Disconnect Jumper from TB02-19 (70104) to TB1-26 (20516) Disconnect Laptop and Pressure Gauges	N/A	N/A

8.0 A-TRUCK TEST

8.1 Supply Pressure

Step	Perform	Verify/Record	Acceptance Criteria
8.1.1	A-End Logic Rack: Connect Laptop to "P+B Logic" Serial Port Initialize PTU Software Set Watch Variables on PTU: BCP Actual, M1, M2, LWA	Record value of LWA	63.4 ± 6.5psi
8.1.2	Repeat Steps 0 to **Error! Reference source not found.** on the A-End	Same as 0 to **Error! Reference source not found.**	Same as 0 to **Error! Reference source not found.**

8.2 Layup Timer

Step	Perform	Verify/Record	Acceptance Criteria
8.2.1	Repeat Section **Error! Reference source not found.** on the A-End	Same as Section **Error! Reference source not found.**	Same as Section **Error! Reference source not found.**

8.3 Manual Release and Slack Adjustors

Step	Perform	Verify/Record	Acceptance Criteria
8.3.1	Repeat Section **Error! Reference source not found.** on the A-End	Same as Section **Error! Reference source not found.** on the Axle 1 and 2 Brake Calipers	Same as Section **Error! Reference source not found.**

8.4 Brake Pressures and Track Brake

Step	Perform	Verify/Record	Acceptance Criteria
8.4.1	Repeat Section **Error! Reference source not found.** on the A-End	Same as Section **Error! Reference source not found.**	Same as Section **Error! Reference source not found.**

8.5 Low Pressure Switch

Step	Perform	Verify/Record	Acceptance Criteria
8.5.1	A-End Relay Panel: Disconnect TB1-35 (21709) (Socket 9/32) A-End to FORWARD, OPERATE	N/A	N/A
8.5.2	A-End Alternate between COAST and FSB until M2 = LOW	• **Record** TC0 when M2 = Low MTU Indication	• 1540 psi ± 10% FRICTION BRAKE FAULT
8.5.3	A-End to NEUTRAL, OPERATE A-End Relay Panel: Reconnect TB1-35 (21709) Clear FRICTION BRAKE FAULT	• Time from Clearing Fault to M2 = NORMAL Time from Clearing Fault to M1 = NORMAL	• < 30 seconds < 2 minutes
8.5.4	A-End to NEUTRAL, STANDBY	N/A	N/A

8.6 Over Pressure Valve

Step	Perform	Verify/Record	Acceptance Criteria
8.6.1	A-End Relay Panel: Hold 2K14 ON until TC0 Stops Increasing **(WARNING: TC0 MUST NOT EXCEED 2670 psi)**	**Record** Maximum TC0	2540 psi ± 70 psi

8.7 Brake Applied Pressure Switch and Brake Released Pressure Switch

Note: This section cannot be completed if the BAPS modification has been completed. Ignore it if the Mod has been completed.

Step	Perform	Verify/Record	Acceptance Criteria
8.7.1	B-End Relay Panel: Connect Jumper from TB02-19 (70104) to TB01-26 (20516) A-End Relay Panel: Connect Jumper from TB02-23 (20516) to TB02-15 (20509). A-End to FORWARD, OPERATE A-End Relay Panel: Measure Voltage between TB01-20 (20513) and Ground A-End to COAST	N/A	N/A
8.7.2	Slowly Move A-End to FSB, Pause when +37V is Measured	• **Record** TT1 MTU Indication	• 1100 psi ± 10% BRAKES APPLIED
8.7.3	Slowly Move A-End to COAST, Pause when +37V is Lost	• **Record** TT1 MTU Indication	• 740 psi ± 100 psi BRAKES APPLIED
8.7.4	A-End to COAST	MTU Indication	BRAKES RELEASED
8.7.5	Slowly Move A-End to FSB, Pause when BCP Actual Begins to Register Pressure on the PTU	• **Record** TT1 MTU Indication	• N/A BRAKES APPLIED
8.7.6	A-End to NEUTRAL, STANDBY B-End Relay Panel: Disconnect Jumper from TB2-19 (70104) to TB1-26 (20516) A-End Relay Panel: Disconnect Jumper from TB2-23 (20516) to TB2-15 (20509). Disconnect Laptop and Pressure Gauges	• N/A	• N/A

9.0 TRACK BRAKE

9.1 Track Brake Breakers and Cutout

Step	Perform	Verify/Record	Acceptance Criteria
9.1.1	A-End to FORWARD, OPERATE	N/A	N/A
9.1.2	A-End to EMERGENCY	Track Brakes	Engaged
9.1.3	A-End Breaker Panel: Open 2Q03 (Track Brake Control)	Track Brakes	Released
9.1.4	A-End Switch Panel: Track Brake Cutout to CUTOUT	Track Brakes	Released
9.1.5	A-End to FSB	Track Brakes	Released
9.1.6	A-End Press Operator's Emergency Pushbutton	Track Brakes	Engaged
9.1.7	A-End Reset Operator's Emergency Pushbutton	Track Brakes	Released
9.1.8	B-End Press Operator's Emergency Pushbutton	Track Brakes	Engaged
9.1.9	B-End Reset Operator's Emergency Pushbutton	Track Brakes	Released
9.1.10	A-End Breaker Panel: Close 2Q03 (Track Brake Control) A-End Switch Panel: Track Brake Cutout to NORMAL	N/A	N/A
9.1.11	Repeat Steps **Error! Reference source not found.** to **Error! Reference source not found.** Using 2Q14 (Track Brake Command) Instead of 2Q03 (Track Brake Control)	Same as Steps **Error! Reference source not found.** to **Error! Reference source not found.**	Same as Steps **Error! Reference source not found.** to **Error! Reference source not found.**
9.1.12	Repeat Steps **Error! Reference source not found.** to **Error! Reference source not found.** with A-End in REVERSE, OPERATE	Same as Steps **Error! Reference source not found.** to **Error! Reference source not found.**	Same as Steps **Error! Reference source not found.** to **Error! Reference source not found.**
9.1.13	Both Ends: Propulsion Cutout to NORMAL	N/A	N/A

10.0 TEST RESULTS

10.1 B-Truck

Step	Measurement	Criteria	Value	Pass/Fail
6.1.1	LWB	N/A		N/A
6.1.2	HPCU Oil Level	Between MIN/MAX		
	HPCU Serial Number	N/A		N/A
6.1.3	TC0	0 psi ± 25 psi		
	TT1	0 psi ± 25 psi		
	TT3	0 psi ± 25psi		
6.1.4	Time to M1 = Normal	N/A		N/A
	TC0 @ M1 = Normal	2250 psi ± 10%		
	Time to M1 = Low	>120s		
	TC0 @ M1 = Low	1740 psi ± 10%		
	Time to M1 = Normal	N/A		N/A
	TCO @ M1 = Normal	2250psi ± 10%		
6.2.1	TC0 @ 1min after LAYUP	>1570 psi		
6.2.2	TC0 @ 30s after 2Q14 Open	0 psi ± 25 psi		
6.3.1	TT1	0 psi ± 25 psi		
	TT3	0 psi ± 25 psi		
	Axle 5/6 Calipers	Engaged		
6.3.2	Axle 5/6 Calipers	Released		
	MTU Indication	B-Truck: (steady)R		
6.3.3	Axle 5/6 Calipers in FSB	Engaged		
	Axle 5/6 Calipers in COAST	Released		

Step	Measurement	Criteria	Value		Pass/Fail	
6.4.1	Track Brake	Engaged				
6.4.2	Track Brake	Released				
6.4.3	TT1	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				
6.4.4	TT1	1475 psi ± 10%				
	BCP Actual	Within 6% of TT1				
	TT3	0 psi ± 25 psi				
6.4.5	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
6.4.6	TT1	0 psi ± 25 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
6.4.7	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Engaged	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
6.4.8	TT1	1475 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	0 psi ± 25 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Engaged	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
6.4.9	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Released	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
6.4.11	TT1	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				

Step	Measurement	Criteria	Value	Pass/Fail
6.5.2	TC0 @ M2 = Low	1540 psi ± 10%		
	MTU Indication	FB Fault		
6.5.3	Time to M2 = Normal	< 30 seconds		
	Time to M1 = Normal	< 2 minutes		
6.6.1	Maximum TCO	2540 psi ± 70 psi		
6.7.2	TT1	1100 psi ± 10%		
	MTU Indication	B-Truck: Steady A		
6.7.3	TT1	740 psi ± 100 psi		
	MTU Indication	B-Truck: Steady A		
6.7.4	MTU Indication	B-Truck: Steady R		
6.7.5	Record TT1	N/A		N/A
	MTU Indication	B-Truck: Steady A		

10.2 C-Truck

Step	Measurement	Criteria	Value	Pass/Fail
7.1.1	LWC-A	N/A		N/A
	LWC-B	N/A		N/A
7.1.2	HPCU Oil Level	Between MIN/MAX		
	HPCU Serial Number	N/A		N/A
7.1.3	TC0	0 psi ± 25psi		
	TT1	0 psi ± 25psi		
	TT2	0 psi ± 25psi		
	TT3	0 psi ± 25psi		
7.1.4	Time to M1 = Normal	N/A		N/A

Step	Measurement	Criteria	Value	Pass/Fail
	TC0 @ M1 = Normal	2250psi ± 10%		
	Time to M1 = Low	>120s		
	TC0 @ M1 = Low	1740psi ± 10%		
	Time to M1 = Normal	N/A		N/A
	TCO @ M1 = Normal	2250psi ± 10%		
7.2.1	TC0 @ 1min after LAYUP	>1570psi		
7.2.2	TC0 @ 30s after 2Q14 Open	0 psi ± 25psi		
7.3.1	TT1	0 psi ± 25psi		
	TT2	0 psi ± 25psi		
	TT3	0 psi ± 25psi		
	3L/4L/3R/4R Calipers	Engaged		
7.3.2	3L/4L/3R/4R Calipers	Released		
	MTU Indication	C-Truck: (Steady) R		
7.3.3	3L/4L/3R/4R Calipers in FSB	Engaged		
	3L/4L/3R/4R Calipers in COAST	Released		
7.4.1	TT1	0 psi ± 25psi		
	TT2	0 psi ± 25psi		
	TT3	0 psi ± 25psi		
7.4.2	TT1	562 psi ± 10%		
	TT2	562 psi ± 10%		
	BCP Actual 1	Within 6% of TT1		
	BCP Actual 2	Within 6% of TT2		
	TT3	0 psi ± 25psi		

Step	Measurement	Criteria	Value		Pass/Fail	
7.4.3	TT1	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT2	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual 1	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual 2	Within 6% of TT2	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
7.4.4	TT1	0 psi ± 25psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT2	0 psi ± 25psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual 1	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual 2	Within 6% of TT2	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
7.4.5	TT1	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT2	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
7.4.6	TT1	562 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT2	562 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	0 psi ± 25psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
7.4.7	TT1	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT2	300 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
7.4.9	TT1	0 psi ± 25 psi				
	TT2	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				
7.5.2	TC0 @ M2 = Low	1540 psi ± 10%				
	MTU Indication	FB Fault				

Step	Measurement	Criteria	Value	Pass/Fail
7.5.3	Time to M2 = Normal	< 30 seconds		
	Time to M1 = Normal	< 2 minutes		
7.6.1	Maximum TCO	2540psi ± 70psi		
7.7.2	TT1	130psi ± 10%		
	TT2	130psi ± 10%		
	MTU Indication	C-Truck: Steady A		
7.7.3	TT1	87 psi ± 100 psi		
	TT2	87 psi ± 100 psi		
	MTU Indication	C-Truck: Steady A		
7.7.4	MTU Indication	C-Truck: Steady R		
7.7.5	Record TT1	N/A		N/A
	Record TT2	N/A		N/A
	MTU Indication	C-Truck: Steady A		

10.3 **A-Truck**

Step	Measurement	Criteria	Value	Pass/Fail
8.1.1	LWA	N/A		N/A
8.1.2 (6.1.2)	HPCU Oil Level	Between MIN/MAX		
	HPCU Serial Number	N/A		N/A
8.1.2 (6.1.3)	TC0	0 psi ± 25 psi		
	TT1	0 psi ± 25 psi		
	TT3	0 psi ± 25 psi		
	Time to M1 = Normal	N/A		N/A

Step	Measurement	Criteria	Value		Pass/Fail	
8.1.2 (6.1.4)	TC0 @ M1 = Normal	2250 psi ± 10%				
	Time to M1 = Low	>120s				
	TC0 @ M1 = Low	1740 psi ± 10%				
	Time to M1 = Normal	N/A			N/A	
	TCO @ M1 = Normal	2250 psi ± 10%				
8.2.1 (6.2.1)	TC0 @ 1min after LAYUP	>1570 psi				
8.2.1 (6.2.2)	TC0 @ 30s after 2Q14 Open	0 psi ± 25p si				
8.3.1 (6.3.1)	TT1	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				
	Axle 1/2 Calipers	Engaged				
8.3.1 (6.3.2)	Axle 1/2 Calipers	Released				
	MTU Indication	A-Truck:(steady) R				
8.3.1 (6.3.3)	Axle 1/2 Calipers in FSB	Engaged				
	Axle 1/2 Calipers in COAST	Released				
8.4.1 (6.4.1)	Track Brake	Engaged				
8.4.1 (6.4.2)	Track Brake	Released				
8.4.1 (6.4.3)	TT1	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				
8.4.1 (6.4.4)	TT1	1475 psi ± 10%				
	BCP Actual	Within 6% of TT1				
	TT3	0 psi ± 25 psi				
	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*

Step	Measurement	Criteria	Value		Pass/Fail	
8.4.1 (6.4.5)	BCP Actual	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
8.4.1 (6.4.6)	TT1	0 psi ± 25 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	BCP Actual	Within 6% of TT1	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
8.4.1 (6.4.7)	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Engaged	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
8.4.1 (6.4.8)	TT1	1475 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	0 psi ± 25 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Engaged	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
8.4.1 (6.4.9)	TT1	1160 psi ± 10%	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	TT3	>1570 psi	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
	Track Brake	Released	*Fwd.*	*Rev.*	*Fwd.*	*Rev.*
8.4.1 (6.4.11)	TT1	0 psi ± 25 psi				
	TT3	0 psi ± 25 psi				
8.5.2	TC0 @ M2 = Low	1540 psi ± 10%				
	MTU Indication	FB Fault				
8.5.3	Time to M2 = Normal	< 30 seconds				
	Time to M1 = Normal	< 2 minutes				
8.6.1	Maximum TCO	2540 psi ± 70 psi				
8.7.2	TT1	1100 psi ± 10%				
	MTU Indication	A-Truck: Steady A				
8.7.3	TT1	740 psi ± 100 psi				

Step	Measurement	Criteria	Value	Pass/Fail
	MTU Indication	A-Truck: Steady A		
8.7.4	MTU Indication	A-Truck: Steady R		
8.7.5	Record TT1	N/A		N/A
	MTU Indication	A-Truck: Steady A		

10.4 **Track Brake**

Step	Measurement	Criteria	Value	Pass/Fail
9.1.2 to 9.1.10	Track Brake	See Procedure	N/A	
9.1.11	Track Brake	See Procedure	N/A	
9.1.12	Track Brake	See Procedure	N/A	