

# Hose Burst Pressure Strength Ratings

TABLE III: BURST STRENGTH FOR SUFFIX A

GRADE	INSIDE DIAMETER	BURST STRENGTH, minimum
1A	ALL	4.1 MPa (600 psi)
2A	ALL	2.1 MPa (300 psi)
3A	ALL	2.1 MPa (300 psi)

bulk hose

preformed  
1B hose

TABLE IV: BURST STRENGTH FOR SUFFIX B, C and F

Hose ID		Suffix B		Suffix C		Suffix F	
Over mm	Thru mm	Grade 1 & 3 MPa	Grade 2 MPa	Grade 1 MPa	Grade 2 MPa	Grade 1 MPa	Grade 2 MPa
0	24	1.72	1.72	2.10	1.72	2.5	2.25
24	32	1.38	1.21	1.90	1.38	2.1	2.25
32	44	1.21	1.21	1.72	1.38	2.1	2.25
44	< 50.8	1.00	1.21	1.38	1.21	1.55	2.25
51	65	0.90	0.69	1.38	1.21	1.38	1.21
65	76	0.62	0.69	1.38	1.03	1.38	1.21
76	102	----	0.55	1.38	0.86	1.38	1.03
in	in	psi	psi	psi	psi	psi	psi
0	1	250	250	300	250	363	326
1	1-1/4	200	175	275	200	300	326
1-1/4	1-3/4	175	175	250	200	300	326
1-3/4	< 2	145	175	200	175	225	326
2	2-1/2	130	100	200	175	200	175
2-1/2	3	90	100	200	150	200	175
3	4	----	80	200	125	200	150

preformed  
1BF hose

*From MPAPS F-30:  
Coolant hose burst  
strength*

**Grade 1** – This grade covers a premium, long life hose used in engine coolant systems (including heater) and clean air supply lines.  
**Suffix B** – Preformed hose reinforced with ply or plies of knitted or spiraled para-aramid (Kevlar) yarn.  
**Suffix F** – Increased operating condition hoses – This increases minimum burst, changes yarn to meta-aramid (Nomex) or approved hybrid aramid blends for increased torsion-vibration performance, and changes from a plain stitch to lock stitch (less swell) for most sizes.

**Field tests on vehicles** – originated from customer complaints with hoses bursting

- Vehicles with 1B hoses had burst events within 1 year
- Vehicles with 1BF hoses had no failures
- After installing 1BF hoses, there were no more complaints (*problem turned OFF*)

**Tests at coolant hose supplier** – All testing was done for A-to-B comparative purposes only. Pressure-Temperature (PT) and Pressure-Vibration-Temperature (PVT) on hose samples showed Nomex plain stitch reinforced hose (qualifies as 1BF) significantly outperformed Kevlar hose (1B):

- Nomex hose PT test ran on average 3x more pressure cycles, when it was stopped, with no change in the burst pressure level (>400 psig) before and after test. Kevlar hoses had burst at as low as ~33,000 cycles at <75 psig
- Nomex hose PVT test ran on average 4x more pressure cycles, when it was stopped, with no change in the burst pressure level (>400 psig) before and after test. Kevlar hoses had burst at as low as ~7,000 cycles at <75 psig
- On the engine side, there were no more hose failures after move from 1B to 1BF (~2013) (*problem turned OFF*)

**Per discussion with Materials Engineering, 1BF hose is recommended for all new releases for Navistar product including IC Bus.**

# Recommendations

- Based on recorded data, recommendation is to use **1BF** hose:
  - Max. steady-state pressures: 200 [psig] (1B) < 300 [psig] (1BF)
  - With all of pressure, temperature and vibration cycles exerted on hoses, various shapes of preformed hoses that affect hose durability (non-straight), the correct way to go is to 1BF coolant hose
  - Materials Engineering is recommending a phase out of 1B hoses
  - April 2014 - Hose design burst pressure requirements changed from 3x to 4x steady coolant system operating pressure
- Major release set to “E”: **08/08/2014**
- Plant effectivity dates:

Plant	In Effect	Status
002 Springfield Assembly Plant	2015/01/12	Materials Planned
009 Conway Assembly Plant	None	Materials Planned
011 Blue Diamond Assembly Plant	2015/03/09	Materials Planned
014 Tulsa Assembly Plant	2015/03/02	Materials Planned
020 Chatham Assembly Plant	None	None
025 Export Logistics Partner	2015/02/16	Materials Planned
062 Garland Assembly Plant	None	Materials Planned
063 Agrale, Brazil	2015/02/16	Materials Planned
065 Escobedo Assembly Plant	2015/01/12	Materials Planned
096 BRAZIL BUS	2015/02/16	Materials Planned
455 NC2 SOUTH AFRICA	2015/02/16	Materials Planned



**Tulsa**

# Coolant Hose Design Validation

## RE MF DT 2010 EPA Coolant System Pressure Test Outline Completed Jan 2015

Method: System Pressure Availability - EW410000, with conditions below				
Run	Engine speed [rpm]	Cap on temperature	Run until temperature	Configuration notes
1	2600	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump on, Heater CCV open, Heater shutoff valve open; after thermostat opens, slam heater CCV shut
2	2600	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump off, Heater CCV open, Heater shutoff valve open
3	2200	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump on, Heater CCV open, Heater shutoff valve open; after thermostat opens, slam heater CCV shut
4	2200	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump off, Heater CCV open, Heater shutoff valve open
5	1700	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump on, Heater CCV open, Heater shutoff valve open; after thermostat opens, slam heater CCV shut
6	1700	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump off, Heater CCV open, Heater shutoff valve open
7	1500	100F @ Engine Coolant Out	205F @ Engine Coolant Out	Booster pump off, Heater CCV open, Heater shutoff valve open

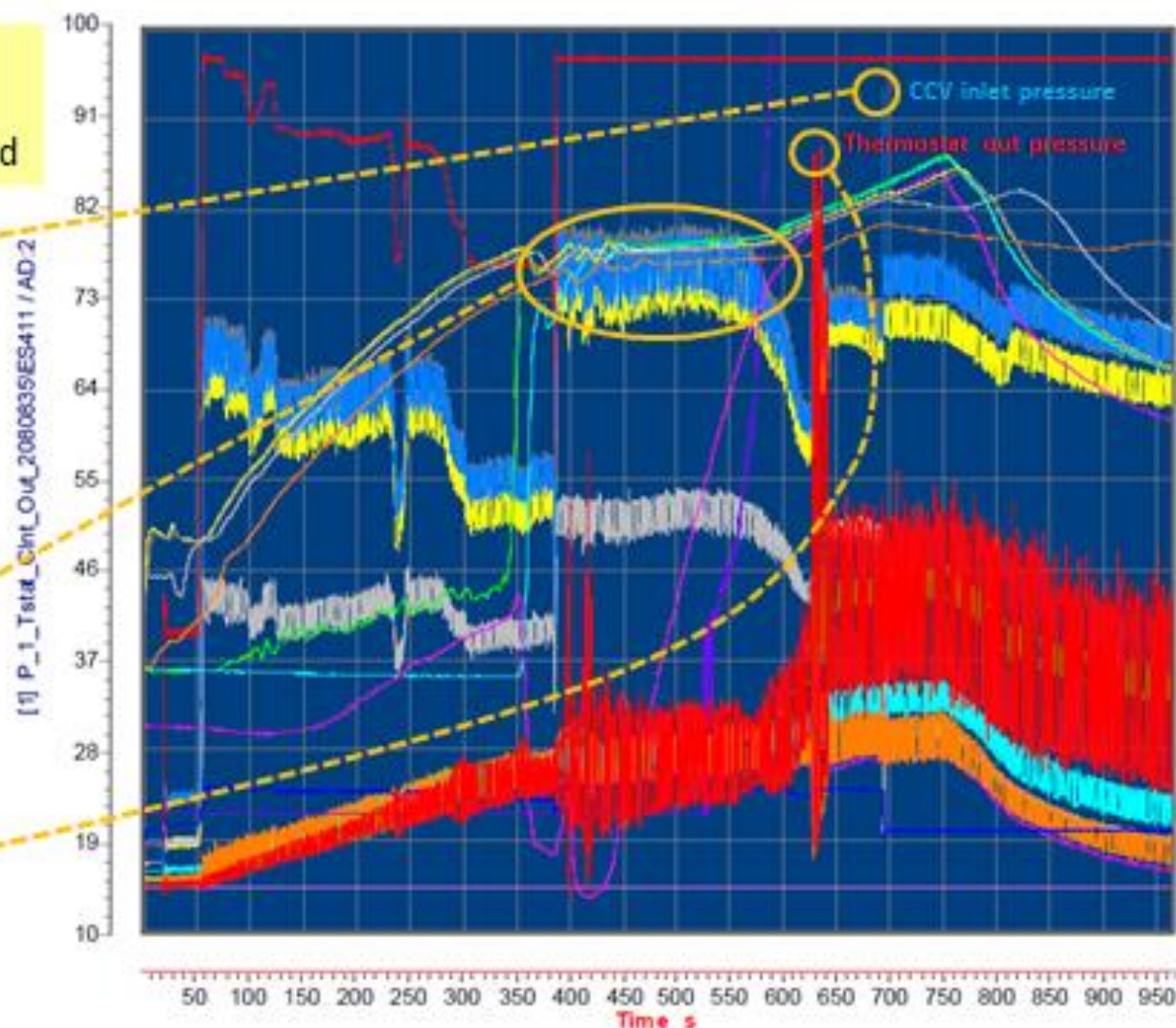
## RE bus test data: Highest coolant pressures recorded

Engine speed: 2600 [rpm]  
Booster pump: ON  
Heater CCV: Open, then closed

Coolant pressures at the CCV inlet (~booster pump out) when it is closed seen up to **80 [psig]**

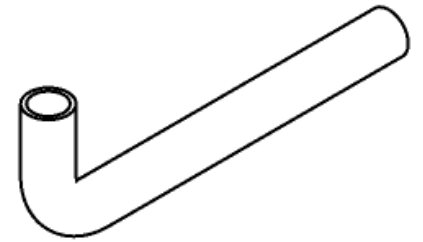
Steady operating pressures with engine under load can go up to **65 [psig]**

Coolant pressure at thermostat outlet can reach **75 [psig]**

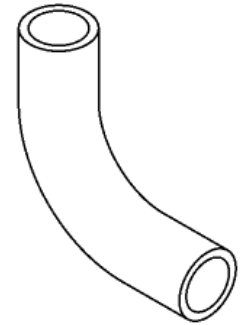


## High Volume IC Bus Molded Hoses

Original Part Number - 3817030C1 – Updated to 3817030C2  
Used on multiple Bus Models, multiple locations



Original Part Number 3854779C1 – Updated to 3854779C2  
Used on multiple Bus Models , multiple locations



Original Part Number 4046000C1 – Updated to 4046000C2  
Used on CE Model with ISB, RH Engine to Body at Valve



Original Part Number 4047777C1 – Updated to 4047777C2  
Used on CE Model with ISB, Stepwell to Engine Return



# IC BUS RE Coolant Hose Updates

## Molded Hoses

Old	New
3817030C1	> 3817030C2
3854779C1	> 3854779C2
4046000C1	> 4046000C2
4047777C1	> 4047777C2

## Molded Coolant Hose



### High Volume IC Bus Molded Hoses

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Original Part Number 4046000C1 – Updated to 4046000C2  
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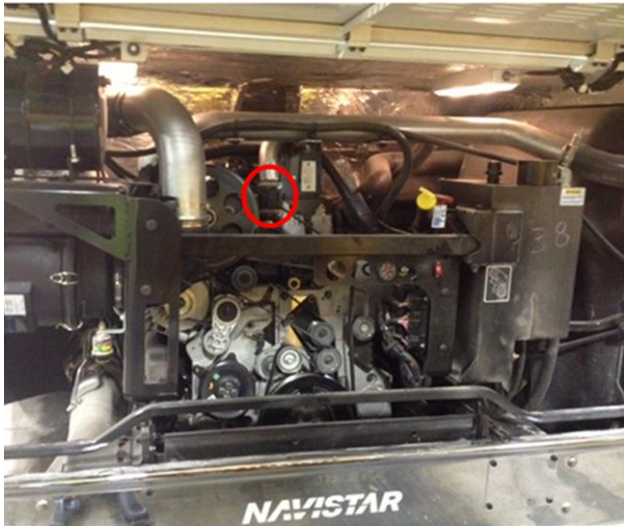
Original Part Number 4047777C1 – Updated to 4047777C2  
Used on CE Model with ISB, Stepwell to Engine Return

✓ All molded coolant hoses on Bus and Truck models were updated to 1BF hose design. Change increased burst strength from 200 to 300 PSI.

**Break Date:** Mar 24, 2015  
**Clean Unit:** LS 1822 / GB103547



## Thermostat Hose



### Issue:

Thermostat hose 503424C1 failures in the field.  
Hose is used on RE models. Need to investigate new hose construction so that the hose does not swell under pressure and burst.

### Resolution:

Changing hose to a lock stitch hose.  
Old Part SAP code in label is 20313869 and New part SAP code is 20836672  
, and will be identified with the following...  
"Fleetrite Premium Coolant Hose"  
"503424C1, 34289, 2.24 20836672."

**Break Date: 10/28/15**

Clean Unit: GB413905

Release:

PCBL:

Pyxis: 371746 **New Hose.... 2.24**





## Bulk Hose

Part Number: L2643493

New part number replaces 1B to 1BF Hose

10/27/2015 12:28:58 PM

<b>Product:</b>	Extended Description	Current Replaced Part	Mkt Mth	Order On Demand	Oversize
<b>L2643493</b>	<b>HOSE HEATER</b>		<b>PDC</b>	<b>N</b>	<b>N</b>
Weight	Sales Set	Sales Set Qty	Product Status Code	Hazardous	
<b>0.3608</b>	<b>MP</b>	<b>50</b>	<b>A</b>	<b>N</b>	
Return Eligible Flag	Published Eligibility Flag				
<b>Y</b>	<b>Y</b>				