

Sequence X

ASTM D8729

Ford Chain Wear Test

Surveillance Panel Meeting

June 11, 2026

Prepared by: Alfonso Lopez, SP Chairman

Meeting Minutes

Attendance list Appendix 3

Minutes from the 10/28/25 motion to approve.

Motion – Mike Deegan

Second – Luca Silva

O&H Report – Jason Soto

1. Attached – Appendix 1
2. Discussion
 - a. Labs currently running BC pistons for the Sequence X. These pistons are nearly depleted. Remaining engines are of 2018 vintage. The 2018 engines have a mix of CA and AA pistons. Panel to develop a piston introduction plan.
 - b. 2012 build manual shows piston to bore clearances that are not representative of what is seen on the 2018 engines. Ford to supply 2018 engine manual.
 - c. Engine harnesses are in short supply. Harnesses are being used more than six times. Dan at TEI will be supplying prototype harness for prove-out. TEI plans on supplying harnesses.
 - d. Evap lines have been discontinued. O&H to work on procurement options.
 - e. Hardware list for non critical hardware needs full review. Turbo availability is unknown.

IMTS Engine Reman

1. Dave Passmore reported progress on the block preparation. Sleeve design is complete. Need Ford input on piston source. Timeline for hardware depletion and GF8 are needed for IMTS to go into production mode on the block re-man.

Fuel Supplier Report – No report.

TMC Report – Dylan Beck

1. Appendix 2
2. No calibration issues
3. TMC has reached out to the suppliers of oils 270 and 271 for possible re-blends. Waiting for feedback.

Action Item List

- ~~1. Reference oil aging survey – TMC – TGC (Oil 270 10 years old)~~
2. Lab hardware survey – Labs
3. Non-critical hardware for GF8 – IMTS
4. Engine Harnesses – TEI
- ~~5. Reach out to 270 and 271 supplier for reblend (TMC)~~
6. Ford to supply 2018 manual.
7. TEI to provide prototype engine harness
8. Evap line bundle replacement options

Appendix 1

Sequence X OH Task Force Update

SEQUENCE X HARDWARE AND OPERATIONAL LOG

By: Jason Soto

05/21/2018

01/23/2024 V2

02/20/2025 V3 Timing Tensioner

Pistons



Only AC2, BB and BC pistons are currently approved for Sequence X testing.

- 2016 engines came with a mix of BC and BB pistons.
- BC pistons are used for CW and BB pistons for FLSPI.
- 2018 engines came with CA and AA pistons. Working on motion 06/11/2026 for approval.
- BC, CA, and AA pistons all use the same piston rings.
- BB pistons use different rings. A limited lifetime purchase was made.

Pistons cont.



- BB and BC pistons have a cast top. AC and AA pistons have a machined top.
- BB and BC pistons have four smoke holes. AC and AA pistons have six smoke holes.

Crankshaft Balancer



Only the 2016 crankshaft balancer pictured on the right has been approved for Sequence X testing.

- 2018 on the left and 2016 on the right.
- We will continue to use the 2016 style balancer. 2018 balancers will not be used.
- 2016 style balancers can be reused or purchased from the dealership.

Timing Chain Tensioner



- 2018 tensioner on the left and 2016 on the right.
- The timing chain tensioner is a critical batched component for Seq X.

Aluminum tensioners have been approved. Can be introduced through Seq X references.





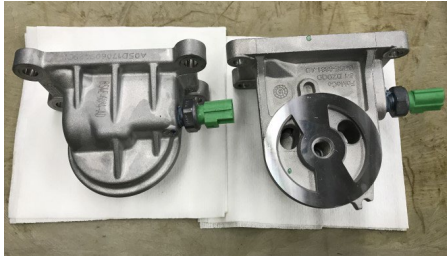
Crankshaft Timing Gear



Both gears have been approved for Sequence X testing. The 2018 gear on the left must be introduced on a reference test at each lab.

- 2018 timing gear on the left and 2016 on the right.
- The 2018 gear does not use a diamond washer.
- The crankshaft timing gear is a critical batched component for the chain wear test.

Oil Filter Housing



- 2018 oil filter housing on the left and 2016 on the right.
- The 2018 oil filter housing does not accept an oil cooler.
- **Only the 2016 style oil filter housing should be used for CW and FLSPI.**

Spark Plugs



- Old part number (in procedure): CYC12Y2
- Current available part numbers: CYFS-12Y-PCT and CYFS-12Y-PCTX
- **New part numbers need to be included in the procedure.**

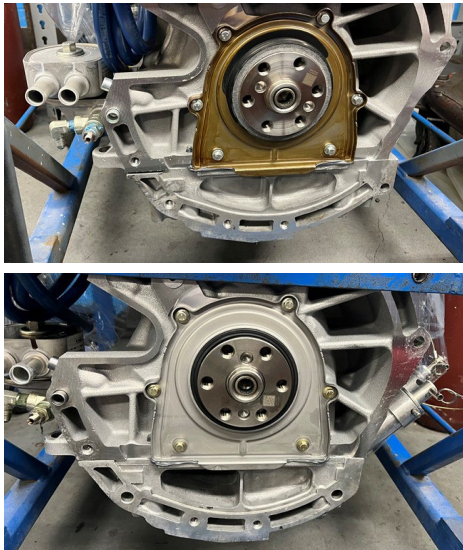
8.21.10 *Spark Plugs:*
8.21.10.1 Install new Motorcraft CYFS-12-Y2 spark plugs.³² These come pre-gapped.
8.21.10.2 Torque the spark plugs to 9 N-m to 12 N-m.
8.21.10.3 Do not use anti-seize compounds on spark-plug threads.

Valve Seals



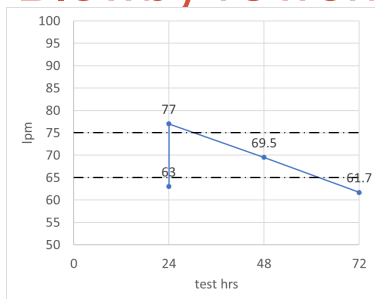
- New valve seals (pictured) are a darker color than in the past. No other visible differences.
- This was brought up in the 2023 build workshop at Lubrizol.
- The darker colored valve seals can be used. Ford is looking into any potential differences.

Rear Main Seal



- Older rear main seal is pictured on top and new rear main seal is pictured on bottom.
- There does not appear to be any dimensional differences between both seals. Only difference is color.
- Both rear main seals are acceptable for Sequence X testing.

Blowby rework average



Test hour	post re-gap	pre re-gap
24hr	77	63
28hr	69.5	69.5
72 hr	61.7	61.7
0-72hr avg	69.40	64.73

8.17.1.3 To achieve an average blowby of 65 L/min to 75 L/min, an adjustment may be necessary immediately before or after the 24 h measurement.

8.17.1.4 A 24 h blowby value of at least 70 L/min is recommended. The 24 h to 120 h blowby average shall fall within 65 L/min to 75 L/min.

8.17.1.5 Ring gap adjustments are not allowed once the test has resumed after the 24 h blowby reading.

TABLE 10 2nd Stage Recommended Blowby Readings

Test Hours	Recommended Average Blowby Reading, L/min
3.5 to 3.75	70
23.5 to 23.75	65 to 75
47.5 to 47.75	65 to 75
71.5 to 71.75	65 to 75
95.5 to 95.75	65 to 75
119.5 to 119.75	65 to 75
143.5 to 143.75	65 to 75
167.5 to 167.75	65 to 75
191.5 to 191.75	65 to 75
215.5 to 215.75	65 to 75

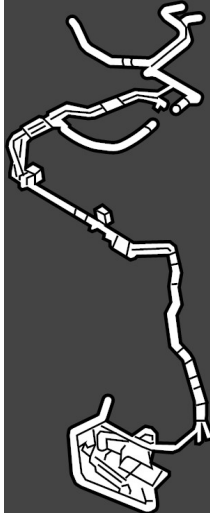
Pending resolution.

Main Engine Wiring Harness



- CB5Z9S468C / CB5E9S468AF (Discontinued)
- TEI has been working on a replacement. No current product available.
- Update from TEI?
- Added 06/11/26

Evaporative Emissions System Lines



- CB5Z9S468C /CB5E9S468AF
(Assembly **Discontinued**)

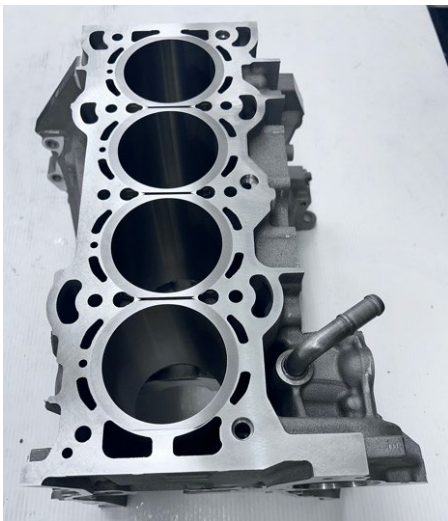
- Individual sensor part #'s:

- CB5E-9E882-BA*
- BB5A-9F479-BC*
- BL3E-9K378-BA*

(*Multiple revisions)

Added 06/11/26

Engine Rebuild Update



- IMTS is working on rebuilding engines for GF8.
- Status update?
- Consumables- how long will they be available for?
 - Injectors
 - Gasket kit
 - Turbos...
- Added 06/11/26

Appendix 2

TMC Update

Sequence X



April 2026

Sequence X Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	7
Acceptable Discrimination Test	AS	4
Statistically Unacceptable Calibration Test	OC	2
Operationally Invalid Calibration Test	LC	1
Aborted Calibration tests	XC	0
Total Number of Tests		14

Sequence X – Failed Tests

Test Status	Number of Tests
Zi Level 2, Ei Level 3 (mild)	1
Ei Level 3	1
Total	2



Sequence X – Lost Tests*

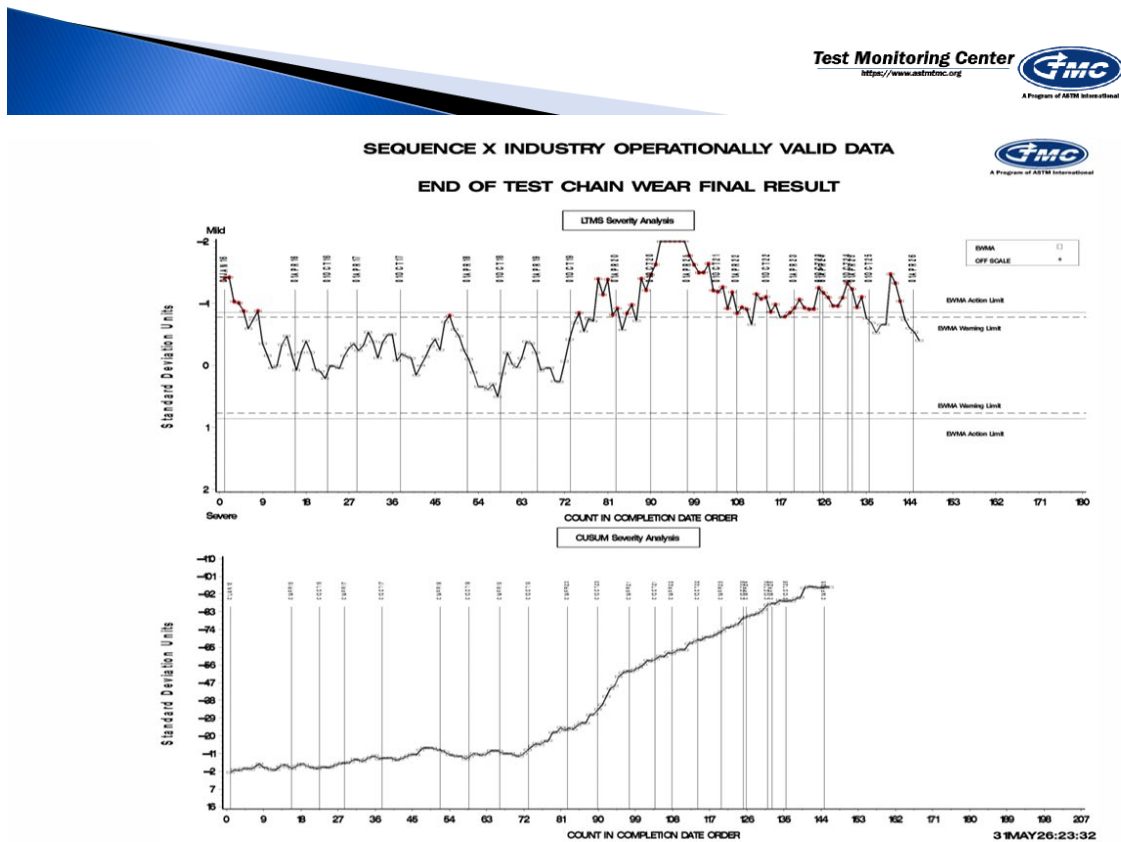
Test Status	Cause	#
Invalid	Air Charge Temperature (–QI)	1
Aborted	No aborted tests	0
Totals		1

*Invalid and aborted tests

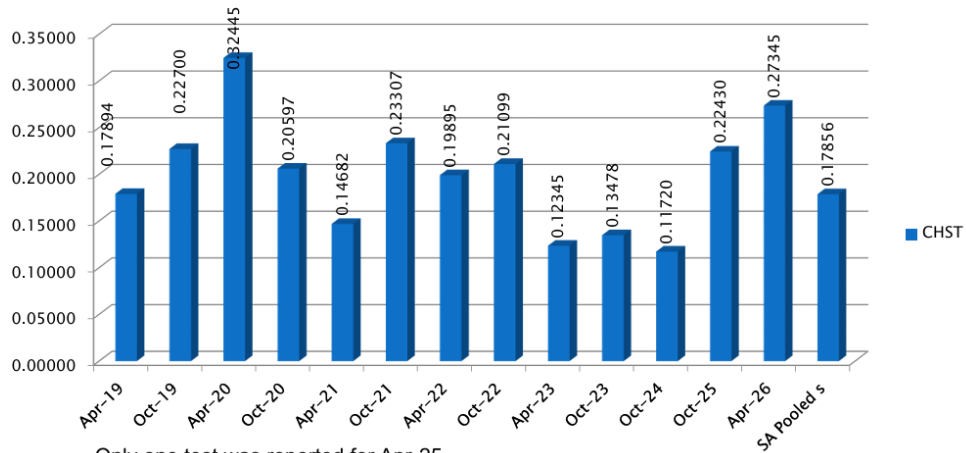


Sequence X Test Severity

- End of test chain wear is currently in control but had been in action alarm in the mild direction for quite some time. Remains unknown if the mild trend has ceased.



Sequence X Precision Estimates



Only one test was reported for Apr-25 period, no precision estimate is available

[Return to Table of Contents](#)



Appendix 3

Attendance List

Sequence X Surveillance Panel Meeting				
June 11, 2026				
Attendance List				
Martin Chadwick Intertek <martin.chadwick@intertek.com>		IAR	Rais, Khaled <khaled.rais@swri.org>	SWRI
Dan Lancot <DLancot@tei-net.com>	x	TEI	Stevens, Andrew <Andrew.Stevens@Lubrizol.com>	Lubrizol
Dave Passmore	x	IMTS	preston.tarry@bp.com	x BP
Mathew Bowden		OHT	Lopez, Alfonso <al.lopez@intertek.com>	x Intertek
Jason Bowden <jhbowden@OHTech.com>	x	OHT	Deegan, Michael (M.D.) <mdeegan@ford.com>	x Ford
Jason Soto Intertek <jason.soto@intertek.com>	x	IAR	Lichte, Michael D. <michael.lichte@swri.org>	SWRI
Martinez, Jo G. (jogm) <JoMartinez@chevron.com>	x	Chevron	George Szappanos	x LZ
Samuel Seth Demel		Shell	Tony Catanese	LZ
Gleason, Joseph <Joseph.Gleason@lubrizol.com>		Lubrizol	Phil Scinto	LZ
Kostan, Travis G. <travis.kostan@swri.org>		SWRI	Timothy Cushing <timothy.cushing@gm.com>	GM
Ed Hennessy		Haltermann	Michael Luhard	Afton
Khaled, Zreik Khaled.zreik@gm.com	x	GM	Ben Maddock	Afton
Salvi, Luca <luca.salvi@exxonmobil.com>	x	ExxonMobil	Angela Willis	Infineum
Amol C Savant <ACSavant@valvoline.com>		Valvoline	Haing Tang	Chrysler
'Bob.Campbell@aftonchemical.com'		Afton	William Hairston	x Haltermann Carless
Amanda Stone		Afton	Bill Bovensiepp	Haltermann Carless
Jason Lekavich	x	Afton	Joseph Hoen	Afton
Layne Tierney		Afton	na.tyrer@gm.com	GM
Patrick M. Lang <patrick.lang@swri.org>	x	SWRI	Ricardo Affinito	Chevron
Stockwell, Robert T (Robert.Stockwell@chevron.com)	x	Chevron	sam@astmtmc.org, Sean Moyer	TMC
Bill Buscher Intertek <william.buscher@intertek.com>		IAR	Tierney, Layne <Layne.Tierney@AftonChemical.com>	Afton
Todd Dvorak	x	Infineum	Venkat Deshpande (TEMA) <venkat.deshpande@toyota.com>	Toyota
Joe Anthony	x	Infineum	Clarence McCullum	Richfull
Wesley N. Venhoff <wnv@astmtmc.org>	x	TMC	Pablo Ramirez	IAR
Dylan Beck		TMC	Greer Gibbons	Lubrizol
Sid Clark		IMTS		