

# 4E

IEA Technology Collaboration Programme  
on Energy Efficient End-Use Equipment

## IEA-4E SSL Annex - Task 2 Lifetime of SSL Lamps and Luminaires

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# ***Predictive life test incorporating accelerated aging***

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Australian Research Activity

# Current Research

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- To gather test data to explore accelerated LED lifetime testing through the measurement of the rate of decline in light output while a lamp is operated at an elevated ambient temperature (e.g. 60 °C) for 1,500 hours and linking with luminous flux relationship for ambient and junction temperatures.

# Test Method

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## 1. Accelerated Degradation Test (ADT)

- a) Operate lamps #1 - #5 in thermal chamber at a constant 60°C ambient temperature for a total of 1500 hours with measurements conducted at 0 hours, and subsequently at 150-hour intervals
- b) Store (i.e. no power connected) lamps #11 - #15 in thermal chamber at a constant 60°C ambient temperature for a total of 1500 hours with measurements conducted at 0 hours, and subsequently at 150-hour intervals.
- c) Measurement of photometric quantities (flux, spectral, TLM) of lamps

## 2. Pulse and Soak Tests

- a) Measure start-up (pulse) & stabilised (soak) total luminous flux for lamps (#6 - #10) in integrating sphere at ambient temps of 25°C and 40°C to 100°C in 10°C steps

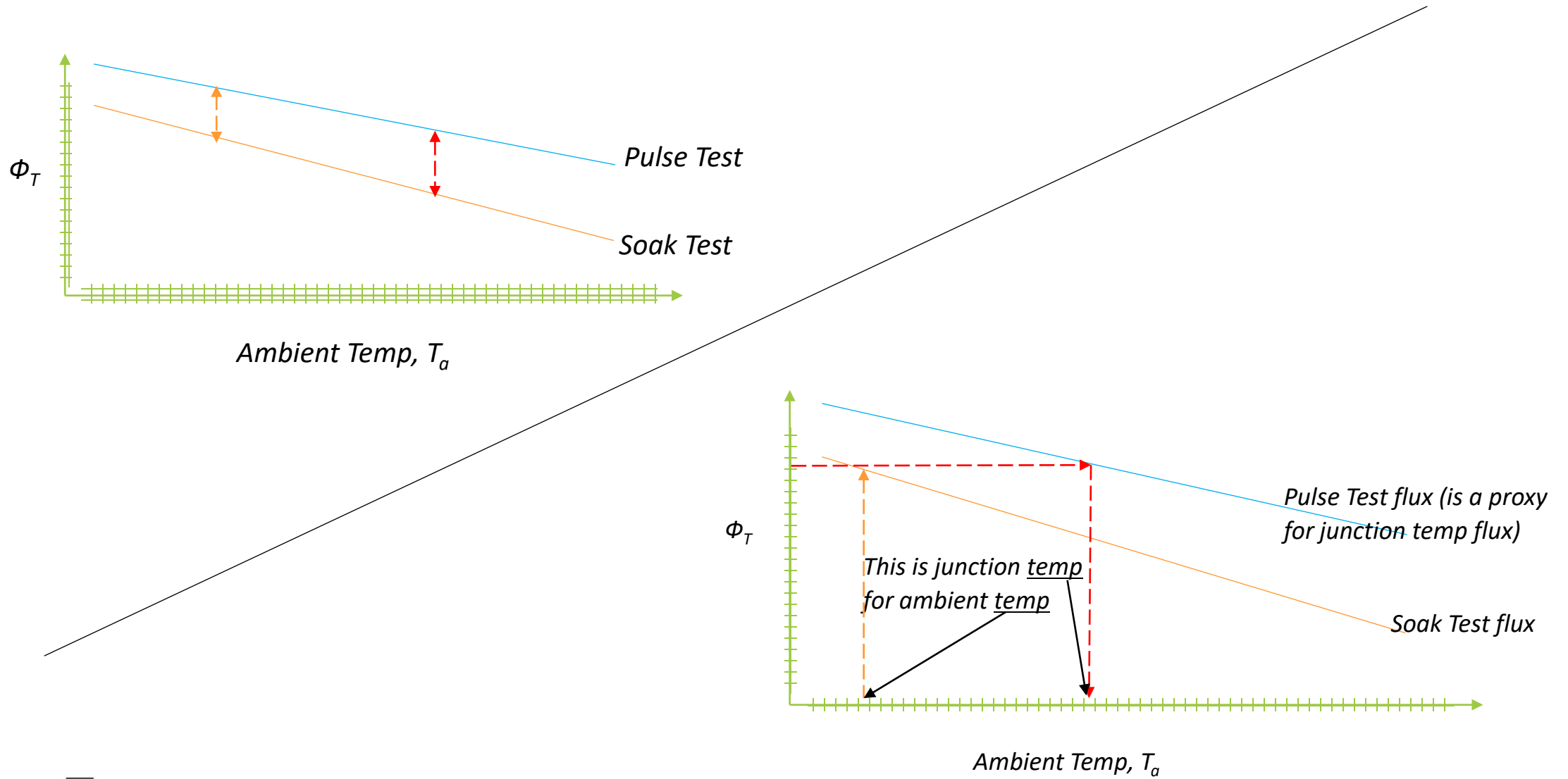
# Model Types to Test

## Sample types selected

Five A-shape models are under test (16 units of each) based on thermal chamber space availability and project budget. Careful to select “quality” (brand) products as do not want lamps to fail early (not the purpose of this research).

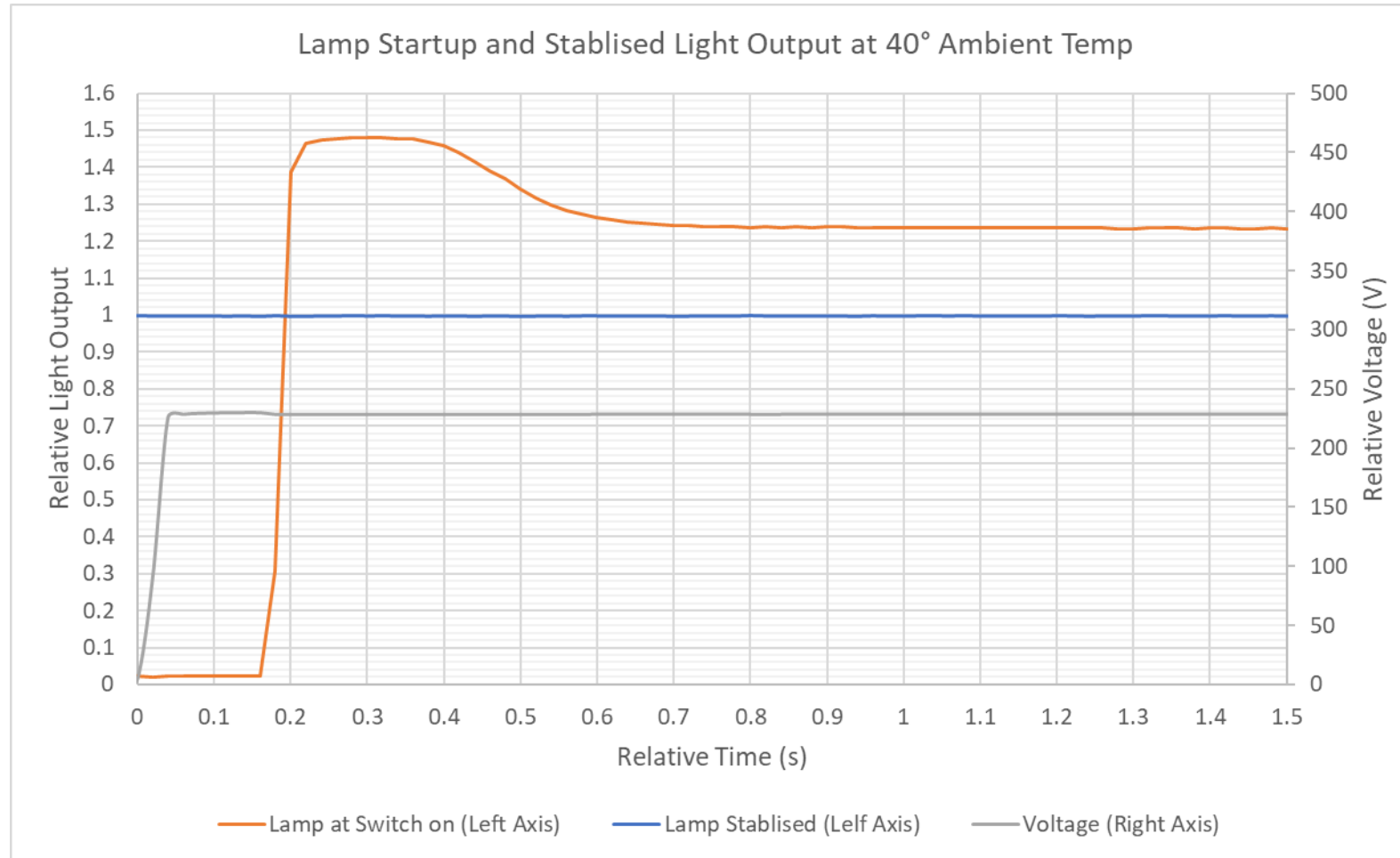
LN Code	Lamp type	LED type	Dim	Rated Power	Rated Lumens	Calculated Rated efficacy	Lifetime	CCT	Reason for selection	Unit Price
LNLED185	A80	COB	no	19	2300	121.1	10,000	6500	High powered lamp with low life yet still high efficacy.	\$ 22.00
LNLED186	A61	COB	no	9	840	93.3	15,000	CW	Average efficacy and typical life claim	\$ 5.00
LNLED187	A50	COB	no	6	470	78.3	15,000	ww	Very low efficacy but typical life claim	\$ 7.00
LNLED188	A60	Filament	no	9.5	1350	142.1	15,000	ww	Expected filament efficacy but no life claim (Other same-brand lamps rated at 15,000 h)	\$ 12.30
LNLED189	Fancy	Filament	yes	5	470	94.0	25,000	3000	Very low efficacy for filament LED (suggests that it has high drive current) and but long life claim	\$ 9.90

# Reminder: Pulse – Soak Test Theory



# Test is ongoing (completion Mid November)

## Example of Pulse & Soak Test Results





# *Lifetime/endurance testing*

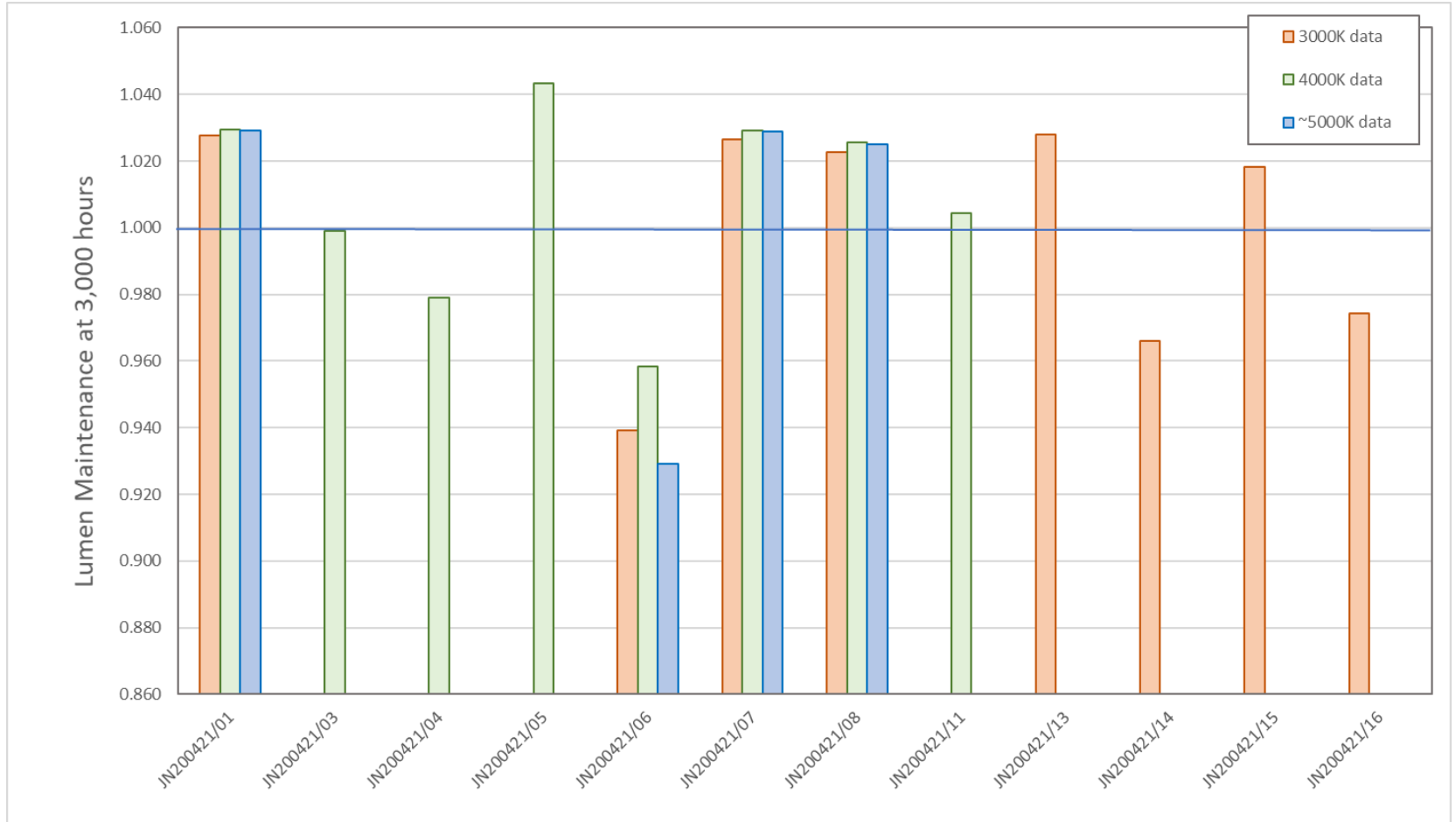
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## Australian Activity



# Latest Luminaire Test Results

## Downlight Luminaires



$$X_{LMF,MIN}\% = 100 \times e^{\frac{(3000 \times \ln(0.7))}{L_{70}}}$$

# Latest Luminaire Test Results

## Downlight Luminaires

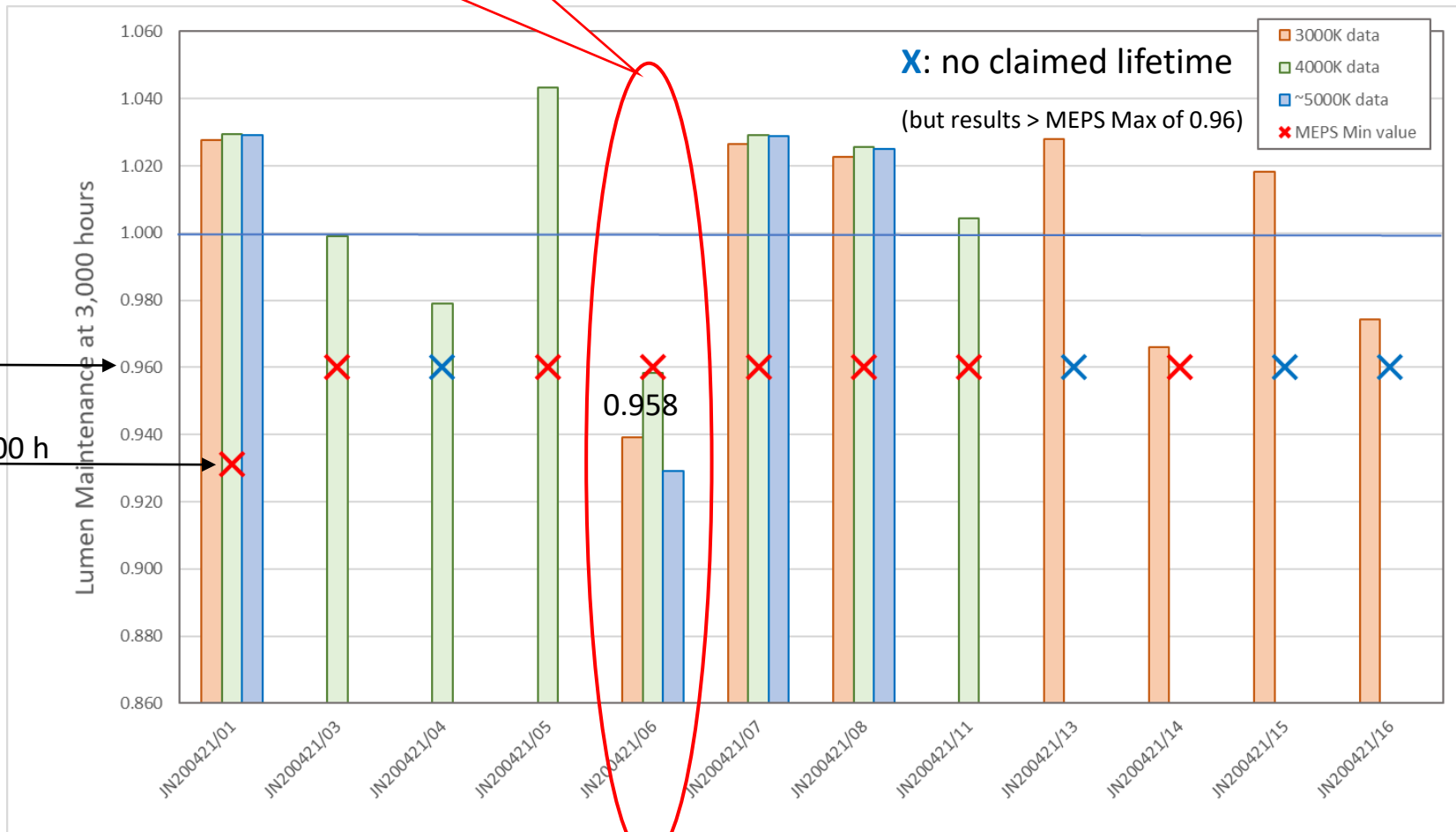


MEPS Limit  
( $L_{70}B_{50} \approx 26,200$  h)

$L_{70}B_{50} = 15,000$  h

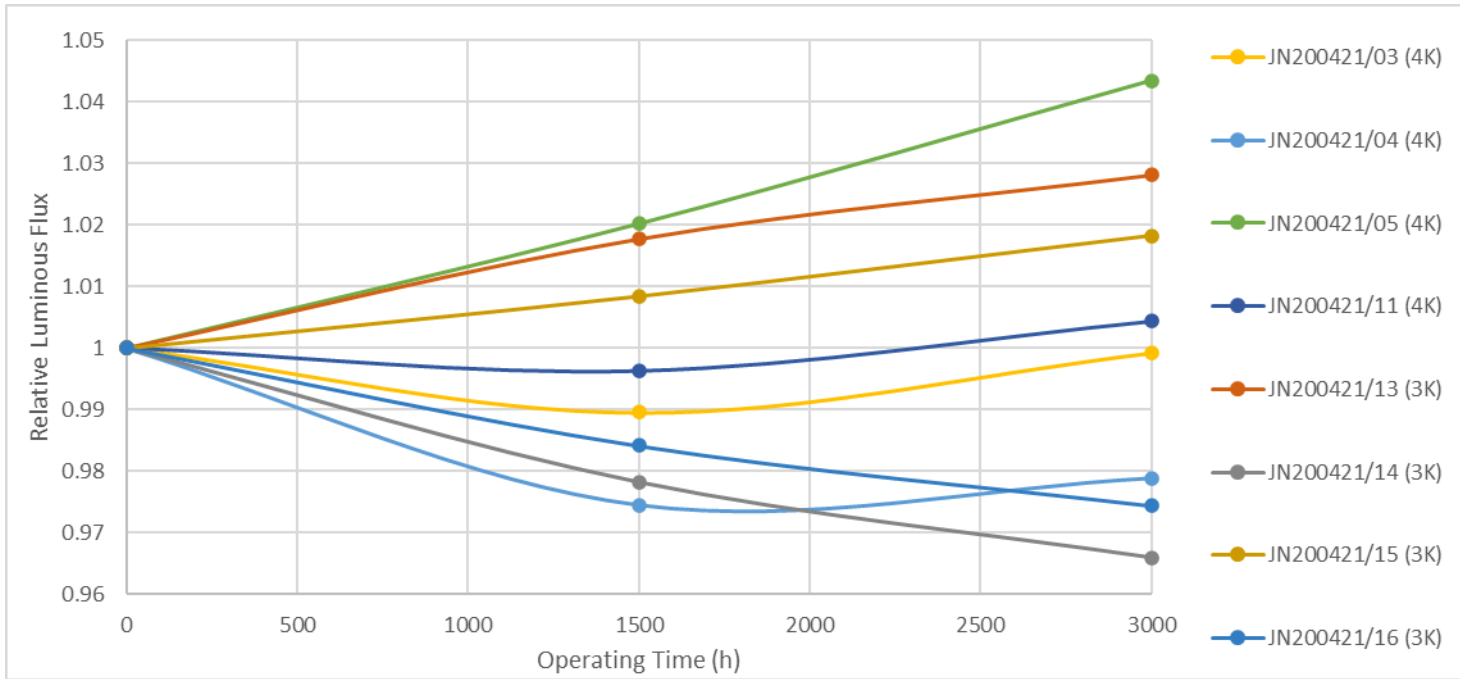


Reference Control Setting??

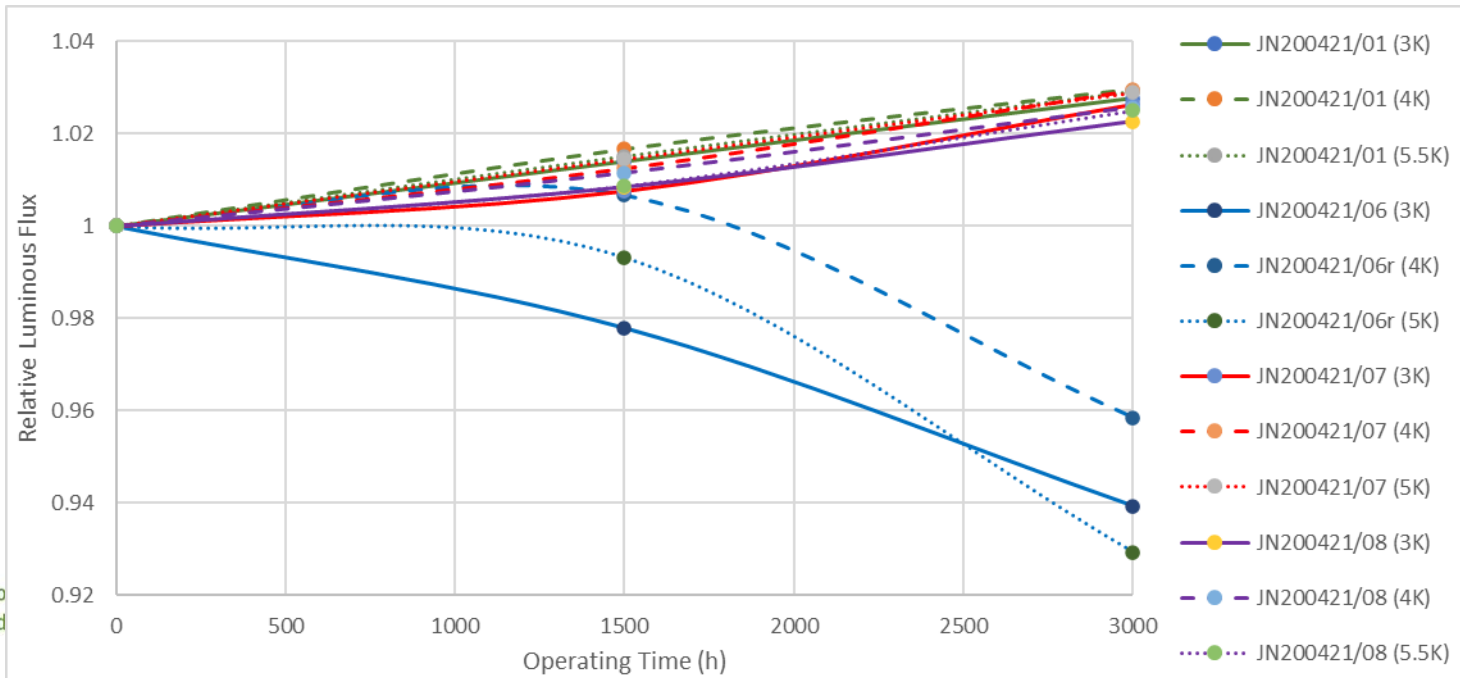




## Fixed CCT products



## Tri-Colour products





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- End