

Ref:	NR/L2/ELP/21088/16
Issue:	1
Date:	5 th December 2015
Compliance date:	1 st March 2016

NR/L2/ELP/21088

Module 16 – Series 1 Maintenance Parameters

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of Network Rail.

© Copyright 2015 Network Rail.

Uncontrolled copy once printed from its electronic source.

Published and Issued by Network Rail, 2nd Floor, One Eversholt Street, London. NW1 2DN.



Ref:	NR/L2/ELP/21088/16
Issue:	1
Date:	5 th December 2015
Compliance date:	1 st March 2016

1 Scope

This module of NR/L2/ELP/21088 covers:

- a) Equipment Design;
- b) Equipment Design Variations;
- c) Equipment Design Designations;
- d) Environmental Conditions;
- e) Maximum Pantograph Operational Speeds;
- f) Continuous Current Carrying Capacity;
- g) Design Staggers and Deviation;
- h) Minimum Staggers;
- i) Design Heights;
- j) Heel Settings;
- k) Track Tolerances;
- l) Maximum Dropper Spacing;
- m) Conductor Particulars;
- n) Conductor Tensions;
- o) Factor of Safety.

2 Definitions

See Glossary (NR/L2/ELP/21088/01)

Ref:	NR/L2/ELP/21088/16
Issue:	1
Date:	5 th December 2015
Compliance date:	1 st March 2016

3 Equipment Design

The Series 1 design is a modern auto-tensioned (A.T.) catenary system developed for use on high speed lines.

The Series 1 design was developed by Furrer+Frey for use on the Great Western Electrification Programme. The system has been developed for use on high speed lines for operation with train speeds of up to 140mph (225km/h). The system principles are founded upon the proven FL200/260 system, which has been in use in Switzerland for over 20 years, and best practice extracted from the GEFF system which has been in operation on the Great Eastern Main Line since 2009.

4 Equipment Design Variations

There is one variation of the Series 1 design, this is detailed in table 1.

Variation	Description
S01-00	Original Series 1 Design.

Table 1 – Equipment design variations

Variation	Mean Contact Force [4.2.11]	Dynamic behaviour [4.2.12]	Uplift [4.2.12]	Pantograph Spacing [4.2.13 (Type A)]	Contact Wire Material [4.2.14]	Contact wire height [4.9.1]	Maximum lateral deviation [4.2.9.2]	GB Specific Case Contact wire height [7.4.2.9.2]
S01-00	Y	Y	Y	Y	Y	N	Y	Y

Table 2 – Conformity of interoperability constituent in accordance with (EU) 1301/2014 – TSI relating to the ‘energy’ subsystem

An Interim Statement of Verification (ISV) is pending for the Series 1 system. The certificate contains all details of conditions and limitations of the design. For full details refer to the ISV certificate.

Ref:	NR/L2/ELP/21088/16
Issue:	1
Date:	5 th December 2015
Compliance date:	1 st March 2016

5 Equipment Design Designations

Table 3 details the equipment design designation.

Variation	Designation
S01-00	S01-00-AT-S

Table 3 – Equipment designations

6 Environmental Conditions

The Equipment is designed for the environmental conditions detailed in table 4:

Designation	Temperature Ranges (Deg C)		
	Min	Max	Design / Setup
S01-00-AT-S	-18	40	20

Table 4 – Environmental Conditions

S01-00 has been designed based upon a maximum OCS conductor temperature of 56°C. This takes into consideration current heating, solar heating and ambient temperature.

For blow off and structure spacing calculations the applicable wind speed shall be assessed on a location specific basis in accordance with BS EN 1991-1-4 and BS EN 50119.

7 Maximum Pantograph Operational Speeds

The maximum operational line speeds for the Series 1 system are quoted in table 5.

Original Designation	Pantograph Operational Speed					
	Single kph	Single mph	Multi (<200m) kph	Multi (<200m) mph	Double Headed kph	Double Headed mph
S01-00-AT-S	225	140	200	125	128	80

Table 5 – Pantograph operational speed

For further details on maximum line speeds for pantograph types and configurations, and for any exclusions, refer to the Series 1 System Description Manual.

Ref:	NR/L2/ELP/21088/16
Issue:	1
Date:	5 th December 2015
Compliance date:	1 st March 2016

8 Continuous Current Carrying Capacity

The continuous current carrying capacity of the system is detailed in table 6:

Designation	Continuous Current Carrying Capacity (A)
S01-00-AT-S	531

Table 6 – Current carrying capacity

The environmental conditions and contact wire wear assumption used for the calculation of the continuous current carrying capacity are based upon a worst case ambient scenario for the UK, as per the Series 1 System Description Manual.

9 Design Staggers and Deviation

Design staggers and deviation are detailed in table 7.

Original Designation	Contact Wire Stagger			Pan Sway (+/-)		Deviation at 4.7m Ht	
	Tangent Track (+/-)	Outside of Curve *	Inside of Curve *	With Wind	Without Wind	From Track C/L *	From Pan C/L **
S01-00-AT-S	230	320	320	230	200	350	600

Table 7 – Design staggers and deviation

* This figure shall be increased by 40mm per metre rise in contact wire above 4700mm (pro-rata)

** This figure shall be reduced by 40mm per metre rise in contact wire above 4700mm (pro-rata)