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Level 3

Energisation of Commercial and Operational Radio Antenna Systems

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Issue record

Issue	Date	Comments
1	June 2007	First Issue
2	August 2008	Updated to reflect Phase 2A reorganisation
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Reference documentation

NR/L2/TEL/30034, *Radio mast lightning protection and earthing system*

NR/L2/TEL/30066, *Signalling and Telecommunications technical clearance for antennae systems*

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 6 March 2010.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 4 to continue to comply with the Issue of any relevant Network Rail Standards current when GRIP Stage 4 was reached and not to comply with requirements contained herein, unless the designated Standard Owner has stipulated otherwise in the accompanying Briefing Note.

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1 Purpose

This Work Instruction specifies the requirements for testing new and upgraded radio antenna systems for compliance with the electric field limits specified in NR/L2/TEL/30066 prior to introducing the system into service.

Radio frequency (RF) transmissions from radio antenna systems on Network Rail land or property may interfere with operational signalling and telecommunications equipment if the transmitted field strengths exceed the defined limits.

2 Scope

This work instruction applies to all new or upgraded radio antenna systems installed on Network Rail land (freestanding masts, attached to structures or tunnels) or property (within station buildings, or on rooftops).

3 Definitions

COSS

Controller Of Site Safety

CSR

Cab Secure Radio

EMC

Electro Magnetic Compatibility

EIRP

Effective Isotropic Radiated Power

EMF

Electro Magnetic Field

Frequency Band

A frequency band allocated to a type of radio transmission (e.g. GSM900, GSM1800, UMTS, etc.). Where it is not possible to define the extent of the frequency band, e.g. for analogue systems, the band shall be considered to cover the frequency range $f_0 \pm f_0/20$, where f_0 is the centre frequency of the transmitter under consideration.

GSM

Global System Mobile

GSM-R

Global System Mobile - Railways

NMC

Network Management Centre

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NRN

National Radio Network

OSGR

Ordnance Survey Grid Reference

PICOP

Person In Charge Of Possession

PTS

Personal Track Safety

RAM(S&T)

Route Asset Manager (S&T)

REB

Relocatable Equipment Building

RETB

Radio Electronic Token Block

RF

Radio Frequency

RIMINI

Risk Minimisation

SMSE[R]

Senior Maintenance Support Engineer [Radio], or other competent engineer approved by the Professional Head (S&T) for this role

STE

System Test Engineer, nominated by the operator or its contractor

UHF

Ultra High Frequency

UMTS

Universal Mobile Telecommunications System

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4 The Energisation Process

1. The third party operator or project shall inform the Senior Maintenance Support Engineer [Radio] when the site construction work or upgrade has finished and the antenna system is ready for energisation.
2. An agreed energisation test plan shall be established, normally via a pre-energisation meeting.
3. The operator shall carry out the tests specified in section 6.
4. The operator shall submit a test report to the Senior Maintenance Support Engineer [Radio].
5. The Senior Maintenance Support Engineer [Radio] or Route Asset Manager (S&T) shall provide an Energisation Acceptance/Rejection Certificate.

5 Compliance Criteria

1. The field strength over NR operational property or at any S&T equipment shall not exceed the level specified in NR/L2/TEL/30066.
2. NR S&T systems, including radio systems, shall continue to operate without degradation.

6 Energisation Tests

Unless specified by the Senior Maintenance Support Engineer [Radio] (see section 6.2), full energisation tests shall be carried out by the system test engineer under a possession.

Test plans for specific radio systems may be presented for approval by the Senior Maintenance Support Engineer [Radio].

Appendix A Energisation Test Method for GSM Systems includes a test method for GSM 900 and GSM 1800 systems and Appendix B **WCDMA Measurements (2100MHz 3G)** includes a test method for UMTS systems. The test methods in these appendices are provided as acceptable methods for demonstrating compliance with the field limits of NR/L2/TEL/30066 and are not mandatory.

6.1 Full Energisation Test

The test requirements of a full energisation test are specified in this section. Variations shall be agreed with the Senior Maintenance Support Engineer [Radio] or Route Asset Manager (S&T).

6.1.1 Test Instrumentation

A suitable electric-field meter shall be used, set to the following settings: