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1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A., establishes minimal requirements regarding design and implementation of dispatcher type radiotelephone networks (RRL).

2 Scope of validity

This specification shall be used when preparing both quotations and Purchase Orders concerning planned LOTOS Group S.A. new investments and modernizations.

It shall also be a base for preparation of other detailed specifications and quotations relevant for package units or other equipment deliveries.

2.1 Deviations

Any deviation from this specification and the relevant specifications, standards and related documents including proposals, which the bidder claims to be economically and / or technically superior solutions, must be submitted in writing for review and approval by Grupa LOTOS SA. Non-approved exceptions are not acceptable by Grupa Lotos S.A.

The supplier must report in writing any ambiguity in this or any other specifications of Grupa LOTOS SA or non-compliance with the referred documents / standards and obtain a written explanation from Grupa Lotos SA.

2.2 Exclusions

The following issues are not subject matter of this specification:

- radiotelephone systems GSM, TETRA
- radiocomms systems DECT, WLAN, BRAN
- radio-links [> 1 GHz]

3 Hierarchy of documents

In case of conflicts existing between this specification and other documents, the following order of precedence shall govern:

- The current Polish legislation
- Terms of purchase order / contract and other requirements agreed in writing with GLSA
- Data Sheets approved by GLSA
- This specification
- Other Specifications
- Drawings and other documents
- Standards

4 Definitions and designations

4.1 Definitions

GLSA – Grupa Lotos S. A.

antenna – a device destined for emission or reception of electromagnetic energy

omnidirectional antenna – the antenna that radiates approximately uniformly in all directions, in horizontal plane

directional antenna – the antenna that radiates in specific direction significantly stronger, than in other directions

half-wave dipole – type of omnidirectional antenna

antenna cable – coaxial cable [50 Ω] connecting an antenna to radiotelephone

manipulator – a device enabling remote operating of radiotelephone by dispatcher

radio broadcasting permission (radio licence) – a document issued by URTiP, determining network parameters

radiotelephone network – set of cooperating base stations, transportable and portable stations

base station – set of devices, cables and accessories, constituting building object or its part

antenna installation – set of cables and accessories connecting the antenna to radiotelephone

power gain – quotient of maximum radiation density produced by an antenna and maximum radiation density produced by reference antenna supplied with the same power

Effective Radiated Power – product of power fed to antenna and power gain

4.2 Designations

BRAN	broadband radio access network
CTCSS	Continuous Tone Coded Squelch System
DECT	Digital European Cordless Telephone
GSM	Global System Mobile
ITU-R	International Telecommunication Union – Radiocomms Sector
RRL	[pol.] land mobile radiocommunication service
PMR	Private [professional, land] Mobile Radio
TETRA	TErrestrial Trunked RAdio
URTiP	[pol.] Office of Telecommunications and Post Regulation
WLAN	Wireless Local Area Network

One shall use designations of GLSA objects according to standard N° 3770 given in chapter 5.

4.3 Ambient conditions

- Ambient temperature (max/min) +36°C/-25°C
- Average monthly humidity (min/max) 70%/90%
- Elevation above sea level 1m
- Wind speed 26 m/s
- Atmosphere typical for refinery Grupa Lotos S. A. (marine, aggressive industrial, chemical and dusty)

4.4 Electric supply conditions

Electric supply source available on site ~230V/50 Hz, TN-S configuration

Each of devices shall be powered from dedicated outgoing in switchgear.

5 Description

5.1 Existing networks

For internal needs of the Grupa LOTOS S.A., several radiotelephone PMR networks are organized in the following bands:

- 150 MHz VHF the service responsible for fire safety (fire brigade)
- 170 MHz VHF the service responsible for personal and property safety (security service)
- 170 MHz VHF railway transport
- 450 MHz UHF production, repair and maintenance services

All those are analogue networks.

Operating modes – simplex, duosimplex, semiduplex, interchannel spacing 12.5 kHz, CTCSS coding. Base, mobile and portable stations are operating in networks. The network organized in UHF band uses frequency channels listed in Enclosure N° 1.

Number of stations approx . 200 items.

GLSA areas are covered within GSM, TETRA and other networks range as well.

5.2 Designing

5.2.1 Radio broadcasting permission (radio licence)

The condition for construction or modernization of radiotelephone network is obtaining of radio licence. On this stage technical and organizational foredesign, required by URTiP, shall be elaborated.

5.2.2 Location of stations

Location of equipment shall be presented on base map (Building Law, art. 43). Geographic coordinates shall be simultaneously determined, with accuracy of 0,1" [second], as well as height of antenna suspension with accuracy of 1.0 m. Authorized land surveyor shall confirm these data – p. 6.1.4.

CAUTION: Geographic coordinates shall not be determined on the grounds of GPS receivers' indications.

5.2.3 Propagation conditions

Useful and interference range shall be determined for each base station. The ranges shall be demonstrated on topographic map prepared in adequate scale. ITU-R directions are valid.

5.2.4 Design documentation

It is necessary to develop design for each base station – p. 6.1.3. In the frameworks of this design, lightning protection of the station shall be resolved [6.2.4, -5], and environmental impact of the station analysed [6.2.6.]. New antenna structures [towers, masts], shall be included within area development design. Specification N° 5120 is also valid while designing antenna structures of total height equal to, or greater than 3m.

5.3 Elements of the system

5.3.1 General requirements

Standard of designed networks results from norms quoted in table 7.2., pos. 7 – 14. All of them are harmonized with New Approach Directive of European Union.

Possibility of PMR networks cooperation with telephony networks and other radio networks is allowed.

On GLSA request, radiotelephone system can be treated as safety system – which entails requirement of adequate PH survival times. Equipment of radiotelephone stations must have CE certificates – p. 7.1. This applies to supporting structures, cables and accessories as well.

Complete software for setting of electrical parameters shall be delivered together with transceivers. Each device shall be provided with set of prongs.

5.3.2 Supporting structures for antennas

An object that base station is to be installed in/on, shall be adapted for this purpose in advance. The most important element is preparation of sub-antenna structure. Light masts with stay ropes are recommended – refer to Enclosure 7.2. Each structure shall feature adequate rigidity, resulting from directions of Polish Standards. Rigidity of the structure loaded with antennas, shall be confirmed by analyses. Access to antennas shall be provided [roof hatch, ladders, hatch access steps, etc.]. Erection of vertical safeguards [SOLL, HACA, etc.] within frameworks of station construction is not foreseen.

5.3.3 Base stations antennas

In a view of small useful ranges [several km], omnidirectional antennas shall be used, in form of half-wave dipoles. In case of stations located on GLSA area boundaries, directional antennas are recommended.

Parameters of antennas: asymmetrical output; 50 Ohm ; voltage standingwave-ratio (VSWR) ≤ 1,6

5.3.4 Antenna channels

Attenuation of antenna installation shall be determined in project – it shall not exceed 3 dB. Flexible, double-screened cables are recommended; lightning arresters – for minimum range of 500 MHz, 20W.

5.3.5 Stationary transceivers

They shall be located in control room premises on operator work-stand or in stand-by premises of other services, e.g. the service responsible for fire safety (fire brigade). Radiotelephone shall be equipped with desktop microphone with PTB button (transmission). Location of the radiotelephone outside control room is allowable in justified cases. A manipulator shall then be installed in control room. Dedicated manipulator shall feature LCD display, microphone on extension arm and ergonomic keyboard.

Electric supply shall be provided – basic one from ~230 V network, and =12V reserve one from battery pack. Battery back-up time – 12 hours. Power cable from low voltage switchgear shall be terminated with separate protection.

5.3.6 Earthing

Earthing system of station must guarantee fulfilling of basic requirements in scope of personnel protection, fire safety and protection of sensible radiotelephone devices [Building Law, art.5]. In case of existing air terminals and earthing electrodes utilization, suitable opinion/expertise is required.

5.3.7 Movable transceivers

They shall feature ergonomic design, so that vehicle driving by driver would not be hindered. Installation of additional loudspeaker is recommended. =12V supply from vehicle battery.

5.3.8 Portable transceivers

They shall feature adequate functionality and durability. Battery chargers shall be delivered along with the transceivers.

5.3.9 Equipment used in zones classified as explosion hazardous

Personnel performing works in explosion hazard zones shall be provided with transceivers of explosion-proof design, adapted to operation in IIC explosion group. Such design shall be confirmed with certificate issued by authorized laboratory. Explosion protection shall fulfil requirements stated by LOTOS Group S.A. in relevant documents, determining explosion zone, device group and temperature classes.

5.4 Scope of services

Services that Supplier of radiotelephone system shall provide, are:

- detailed documentation [factory]
- system software
- factory acceptance test and inspection
- packaging and shipment
- erection on site
- functional tests and connections to other systems
- training of GLSA personnel
- operating manuals, which shall be coherent with operating procedures of GLSA RRL network
- maintenance during guarantee period
- Experimental confirmation of reach for the network of the movable radiotelephony land.

5.5 Construction of base stations

5.5.1 Health and Safety at Work conditions

Construction of radiotelephone stations is connected with performing of construction works on heights. The personnel performing those works shall possess adequate training and equipment – 6.2.3.

5.5.2 Construction and structural adaptations

Adaptation shall consist in seating of antenna supporting structure and preparation of cable routes. Cable brackets and racks, resistant to weather conditions, shall be mounted on supporting structures

and external walls. All structural elements shall be hot galvanized [100 μm]. Inside the building, on the whole route of antenna cable, adequate cable culverts shall be prepared.

5.5.3 Erection of antennas

The antennas shall be fastened to supporting structures according to instructions of their manufacturers. Such instructions shall contain records relating to erection method influence on radiation characteristics. Earthing resistance at antenna shall be measured and recorded.

5.5.4 Antenna installations

Antenna cable shall be durably fastened on the whole route. A lightning arrester is required at each cable entrance to building. Inside objects, depending on needs, overvoltage protectors are to be installed.

Antenna cables cannot be routed in common trays or ducts, together with other telecommunication cables, covered by Specification N° 3720. It is recommended to route the cables in steel tubes or incombustible tubes of Peschel type.

5.5.5 Installation of transceivers

Mechanical and electrical installation shall proceed according to manufacturers' instructions. Parameters of transceivers shall be programmed according to conditions of „radio licence".

5.5.6 Marking

All devices shall be marked with producer's name and brand of supplier. Each device shall be additionally equipped with tag, showing (specific) number of the device, according to documentation and equipment numbering procedure. The devices made in explosion-proof version shall have independent marking, according to PN-EN norms.

The equipment shall be marked with its function designation. Numbering of equipment and cables according to Specification N° 3770.

5.5.7 Trial communication

Useful range of each base stations shall be verified for conformance to conditions of „radio licence". Quality of transmission in portable station → base station relation shall simultaneously be assessed.

5.6 Design documentation

Prior to attempting to detailed design stage, the Supplier shall agree requirements for the system with GLSA representatives (i.e. system functionality, location of equipment, cabling arrangement, interfaces to existing systems). These adjustments shall be prepared in writing.

The documentation shall consist of the following parts at least:

5.6.1 Technical description, including:

- description of existing equipment
- description of part being designed
- functional description (principles of operation)
- detailed description of system components
- operating, installation and maintenance instructions
- list of relevant norms and other documents.

5.6.2 Calculation of Effective Radiated Power and dislocations of structure nodes with antennas

5.6.3 Material schedules

5.6.4 Drawings

- schedule of graphical symbols
- block diagram of station
- cable routes' drawings
- equipment arrangement drawings
- wiring diagrams
- drawings of panels (layout)
- assembly examples

5.6.5 As-built documentation, including updated drawings, reflecting changes in equipment and wiring system.

5.6.6 Start-up check lists, reports from trial communication

5.6.7 Acceptance report

6 Relevant documents

Any "Technical Specification" issued by GRUPA LOTOS S.A. listed in Contract Files.

7 Standards and regulations

It is in each case understood that quoted standards, regulations, directives and orders are of their latest editions, along with amendments, annexes and supplements in force.

7.1 Building regulations

1 THE LAW of 7 July 1994, Building Law
2 Minister of Infrastructure order of 12 April 2002 on technical conditions that buildings and their location should comply with.
3 Minister of Infrastructure order of 3 July 2003 on detailed scope and form of building project
4 Minister of Spatial Economy and Construction of 21 February 1995, on type and scope of geodetic and cartography studies and geodetic activities binding in building engineering.
5 THE LAW on 27 March 2003, on spatial planning and development
6 THE LAW on 16 April 2004 r. on building products
7 Minister of Infrastructure order of 14 October 2004 on European technical approvals and Polish entities authorized for issuing them
8 Minister of Infrastructure announcement of 5 July 2004 on list of mandates granted by European Commission for elaboration of European harmonized standards and guidelines to European technical approvals, along with subject matter scope of these mandates
9 Minister of Infrastructure order of 8 November 2004 on technical approvals and organizational bodies authorized for issuing them
10 THE LAW on 31 August 2002, on conformity assessment system
11 Minister of Economy, Labour and Social Policy order of 12 March 2003 – Low voltage Directive
12 Minister of Infrastructure order of 2 April 2003 – EMC Directive
13 Minister of Economy, Labour and Social Policy order of 28 July 2003 – ATEX Directive.

14 THE LAW on 16 July 2004, Telecommunication Law

15 Council of Minister order of 26 January 2005 – on procedure in case of recording that apparatus, which produces electromagnetic field, disturbs other apparatus work.

16 Council of Minister order of 8 February 2005 – on annual charges for right of frequency disposal

17 Council of Minister order of 29 July 2005 – on National Board of Frequency Applications

18 Minister of Transportation and Building Industry order of 27 December 2005 – on equipment conformity assessment with basic requirements regarding electromagnetic compatibility, and method of marking.

7.2 Selected Polish Standards

Item	Standard No.	Standard titel
Zagadnienia ogólne [**General**]		
1	PN-ETSI EN 301 489-1 V1.4.1:2005	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Norma kompatybilności elektromagnetycznej (EMC) dotycząca urządzeń i systemów radiowych. Część 1: Ogólne wymagania techniczne
	PN-ETSI EN 301 489-5 V1.2.1:2002	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Norma kompatybilności elektromagnetycznej (EMC) dotycząca urządzeń i systemów radiowych. Część 5: Wymagania szczegółowe dla urządzeń lądowej radiokomunikacji ruchomej typu dyspozytorskiego (PMR) i wyposażenia pomocniczego (do transmisji sygnałów mowy i innych)
2	PN-ETSI EN 300 386:2002 V1.3.1:2005 V1.3.2:2004 (U)	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Urządzenia sieci telekomunikacyjnej. Wymagania kompatybilności elektromagnetycznej (EMC)
3	PN-EN 365:2005 (U)	Środki ochrony indywidualnej chroniące przed upadkiem z wysokości. Ogólne wymagania dotyczące instrukcji użytkowania, konserwacji, badań okresowych, napraw, znakowania i pakowania
4	PN-IEC 61024-1	Ochrona odgromowa obiektów budowlanych. Część 1 – zasady ogólne
5	PN-IEC 1312-1	Ochrona przed piorunowym impulsem elektromagnetycznym. Część 1 – zasady ogólne.
6	PN-EN 50383:2005	Obliczenia i pomiary intensywności pola elektromagnetycznego i swoistego tempa pochłaniania energii związanego z ekspozycją ludzi w polach elektromagnetycznych o częstotliwościach od 110 MHz do 40 GHz, wytwarzanych przez radiowe stacje bazowe i stałe stacje końcowe bezprzewodowych systemów telekomunikacyjnych. Norma podstawowa
Urządzenia [**PMR equipment**]		
7	PN-ETSI EN 300 113-1 V1.5.1:2005	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe przewidziane do transmisji danych (i/lub mowy) wykorzystujące modulację o stałej lub niestałej obwiedni, wyposażone w złącze antenowe. Część 1: Charakterystyki techniczne i metody pomiarów **PN-ETSI EN 300 113-2 V1.1.1:2005 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe przewidziane do transmisji danych (i mowy) wyposażone w złącze antenowe. Część 2: Zharmonizowana EN zapewniająca spełnienie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE

8	PN-ETSI EN 300 086-1 V1.2.1:2005	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe z wewnętrznym lub zewnętrznym złączem RF przeznaczone do analogowej transmisji mowy. Część 1: Charakterystyki techniczne i metody badań **PN-ETSI EN 300 086-2 V1.1.1:2005** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe z wewnętrznym lub zewnętrznym złączem RF przeznaczone do analogowej transmisji mowy. Część 2: Zharmonizowana EN zapewniająca spełnienie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE
9	PN-ETSI EN 300 219-2 V1.1.1:2003 (U)	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe emitujące sygnały uruchamiające specyficzne działanie odbiorników. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE
10	PN-ETSI EN 300 296-1 V1.1.1:2005 (U)	ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM). Land Mobile Service. Radio equipment using integral antennas intended primarily for analogue speech. Part 1: Technical characteristics and methods of measurement **PN-ETSI EN 300 296-2 V1.1.1:2003 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe wykorzystujące anteny zintegrowane, przeznaczone przede wszystkim do analogowej transmisji mowy. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE
11	PN-ETSI EN 300 341-1 V1.3.1:2005 (U)	Electromagnetic compatibility and Radio spectrum Matters (ERM). Land Mobile Service (RP 02). Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver. Part 1: Technical characteristics and methods of measurement **PN-ETSI EN 300 341-2 V1.1.1:2003 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma (RP 02). Urządzenia radiowe ze zintegrowaną anteną, emitujące sygnały wywołujące specyficzne działanie odbiorników. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE
12	PN-ETSI EN 300 390-2 V1.1.1:2003 (U)	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe przeznaczone do transmisji danych (i mowy) z anteną zintegrowaną. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE
13	PN-ETSI EN 300 471-1 V1.2.1:2005 (U)	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Protokół dostępu i reguły zajętości w kanałach wspólnych wykorzystywanych w urządzeniach zgodnie z normą EN 300 113. Część 1: Charakterystyki techniczne i metody pomiaru. **PN-ETSI EN 300 471-2 V1.1.1:2003 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Protokół dostępu i reguły zajętości w kanałach wspólnych wykorzystywanych w urządzeniach zgodnie z normą EN 300 113. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE

14	PN-ETSI EN 301 166 V1.1.1:2005 (U)	Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe do komunikacji analogowej i/lub cyfrowej (mowa i/lub dane) pracujące w kanałach wąskopasmowych i wyposażone w złącza antenowe **PN-ETSI EN 301 166-1 V1.1.2:2005 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe do komunikacji analogowej i/lub cyfrowej (mowa i/lub dane) pracujące w kanałach wąskopasmowych i wyposażone w złącza antenowe. Część 1: Charakterystyki techniczne i metody pomiaru. **PN-ETSI EN 301 166-2 V1.1.1:2004 (U)** Kompatybilność elektromagnetyczna i zagadnienia widma radiowego (ERM). Lądowa służba ruchoma. Urządzenia radiowe do komunikacji analogowej i/lub cyfrowej (mowa i/lub dane) pracujące w kanałach wąskopasmowych i wyposażone w złącza antenowe. Część 2: Zharmonizowana EN zapewniająca spełnianie zasadniczych wymagań zgodnie z artykułem 3.2 dyrektywy R&TTE

Tory antenowe [**antenna installations**]

15	PN-88/T-84700/01	Anteny dla radiokomunikacji ruchomej lądowej w zakresie fal metrowych i decymetrowych. Postanowienia ogólne
16	PN-88/T-84700/02	Anteny dla radiokomunikacji ruchomej lądowej w zakresie fal metrowych i decymetrowych. Wymagania elektryczne
17	PN-EN 60966-1: 2002 (U)	Norma wspólna dla kabli współosiowych wielkiej częstotliwości. Norma wspólna. Wymagania ogólne i badania
18	PN-EN 60966-2-1: 2004 (U)	Przewody współosiowe wielkiej częstotliwości. Część 2-1: Norma grupowa na przewody współosiowe giętkie
18	PN-EN 60966-2-2: 2004 (U)	Przewody współosiowe wielkiej częstotliwości. Część 2-2: Norma szczegółowa ramowa na przewody współosiowe giętkie
19	PN-EN 60966-2-3: 2004 (U)	Przewody współosiowe wielkiej częstotliwości. Część 2-3: Specyfikacja szczegółowa dotycząca wiązek giętkich kabli współosiowych
20	PN-EN 60966-3: 2004 (U)	Kable współosiowe wielkiej częstotliwości. Część 3: Norma grupowa dotycząca półelastycznych kabli współosiowych
21	PN-91/T-90600	Przewody współosiowe i symetryczne wielkiej częstotliwości. Ogólne wymagania i badania
22	PN-91/T-90601	Przewody współosiowe wielkiej częstotliwości o jednolitej izolacji polietylenowej
23	PN-EN 122001:2002 (U)	Specyfikacja szczegółowa ramowa. Specyfikacja wojskowa CECC dla złączy wielkiej częstotliwości. Typ MIL-C-39012
24	PN-EN 122002:2002 (U)	Specyfikacja szczegółowa ramowa. Złącza współosiowe wielkiej częstotliwości
25	PN-EN 122xxx:2002 (U)	Specyfikacja grupowa. Złącza współosiowe wielkiej częstotliwości. Serie ...

7.3 EN/IEC equivalent standards

Item	Standard No.	Standard titel
General		
1	EN 301 489-1 EN 301 489- 5	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements *(under revision)* Part 5: Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech)
2	EN 300 386 V1.3.3 (2005-04)	Electromagnetic compatibility and Radio spectrum Matters (ERM);Telecommunication network equipment;ElectroMagnetic Compatibility (EMC) requirements
3	EN 365:2004	Personal protective equipment against falls from a height - General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging
4	IEC 61024-1 (1990-04)	Protection of structures against lightning - Part 1: General principles
5	IEC 61312-1 (1995-03)	Protection against lightning electromagnetic impulse - Part 1: General principles
6	EN 50383:2002	Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz - 40 GHz)
PMR equipment		
7	EN 300 113	Radio equipment with antenna connector for data and/or digitized speech
8	EN 300 086	Radio equipment with antenna connector for analogue speech
9	EN 300 219	Radio equipment transmitting signals to initiate a specific response in the receiver
10	EN 300 296	Radio equipment using integral antennas intended primarily for analogue speech
11	EN 300 341	Radio equipment using an integral antenna transmitting signals to initiate a specific response in the receiver
12	EN 300 390	Radio equipment intended for the transmission of data (and speech) and using an integral antenna
13	EN 300 471	Rules for Access and the Sharing of common used channels by equipment complying with EN 300 113
14	EN 301 166	Radio equipment with antenna connector operating on narrow band channels
Antenna installations		
15	IEC 60489-8 (1984-01)	Methods of measurement for radio equipment used in the mobile services. Part 8: Antennas
16	IEC 60489-8-am1 (2000-10)	Amendment 1 to IEC 60489-8 - Methods of measurement for radio equipment used in the mobile services - Part 8: Methods of measurement for antennas and ancillary equipment
17	EN 60966-1:1999	Radio frequency and coaxial cable assemblies -- Part 1: Generic specification - General requirements and test methods
18	EN 60966-2-1:2003	Radio frequency and coaxial cable assemblies -- Part 2-1: Sectional specification for flexible coaxial cable assemblies

18	EN 60966-2-2:2003	Radio frequency and coaxial cable assemblies -- Part 2-2: Blank detail specification for flexible coaxial cable assemblies
19	EN 60966-2-3:2003	Radio frequency and coaxial cable assemblies -- Part 2-3: Detail specification for flexible coaxial cable assemblies
20	EN 60966-3:2003	Radio frequency and coaxial cable assemblies -- Part 3: Sectional specification for semi-flexible coaxial cable assemblies
21	PN-91/T-90600	---
22	PN-91/T-90601	---
23	EN 122001:1993	Blank Detail Specification: CECC military specification for radio frequency connectors - Type MIL-C-39012
24	EN 122002:1993	Blank Detail Specification: Radio frequency coaxial connectors
25	EN 122xxx:1993	Sectional Specification: Radio frequency coaxial connectors - Series ...

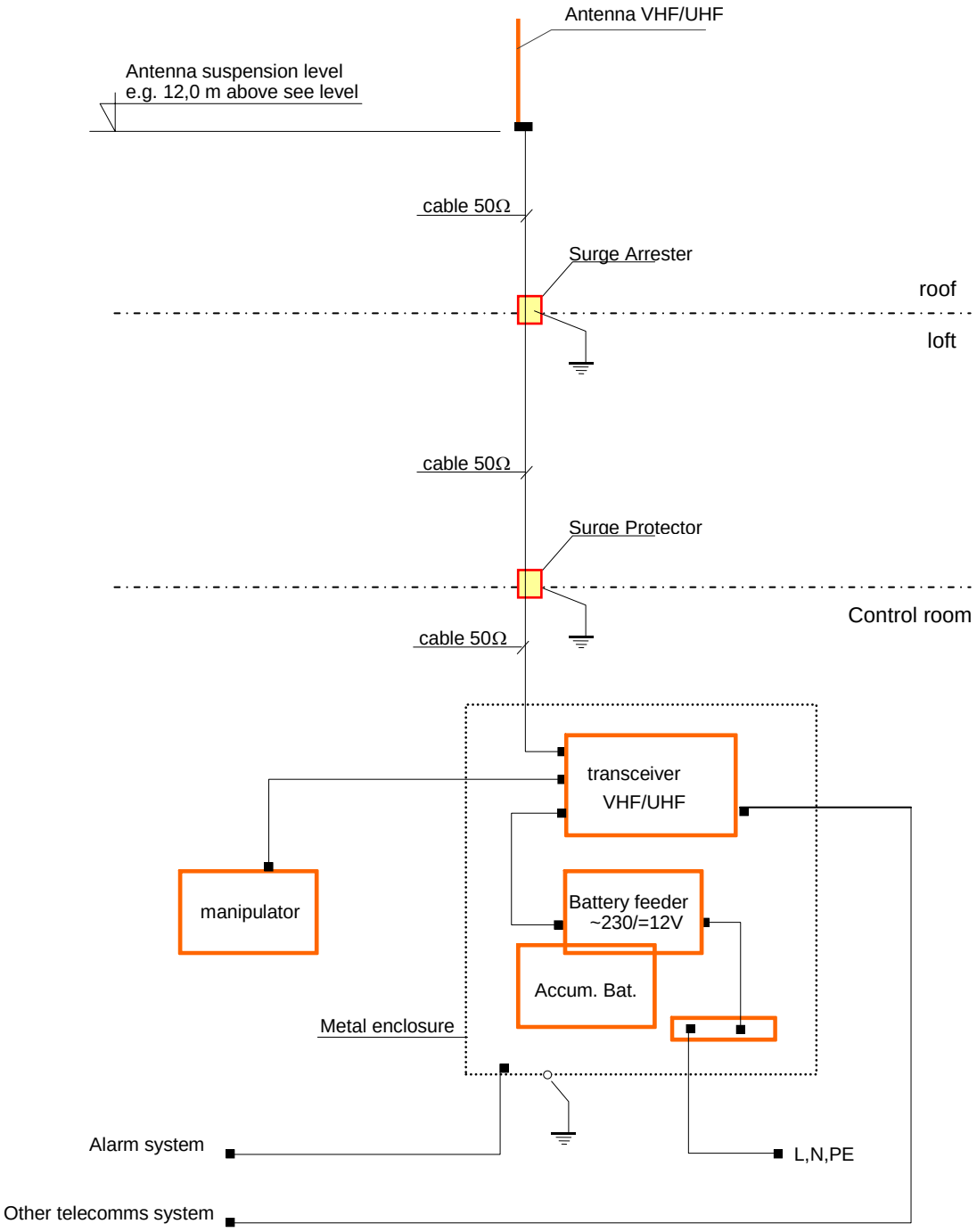
8 Enclosures

- Enclosure No. 1, Block diagram of base station
- Enclosure No. 2, Antenna supporting structure
- Enclosure No. 3, Frequency channels used in UHF network

9 Record of changes

No..	Date	Description	Introduced by
1	30-11-2013 (rev. 1)	Review, update, standardize and changes to the Standard within scope of order No. OK/990/2012	Editorial board coordinated by T.Wróbel
-	31-08-2015	Page layout corrections, no contents changes.	T. Wróbel

Grupa LOTOS S.A.	**ENCLOSURE No.1**	Spec. N°
	Block diagram of base station	3830



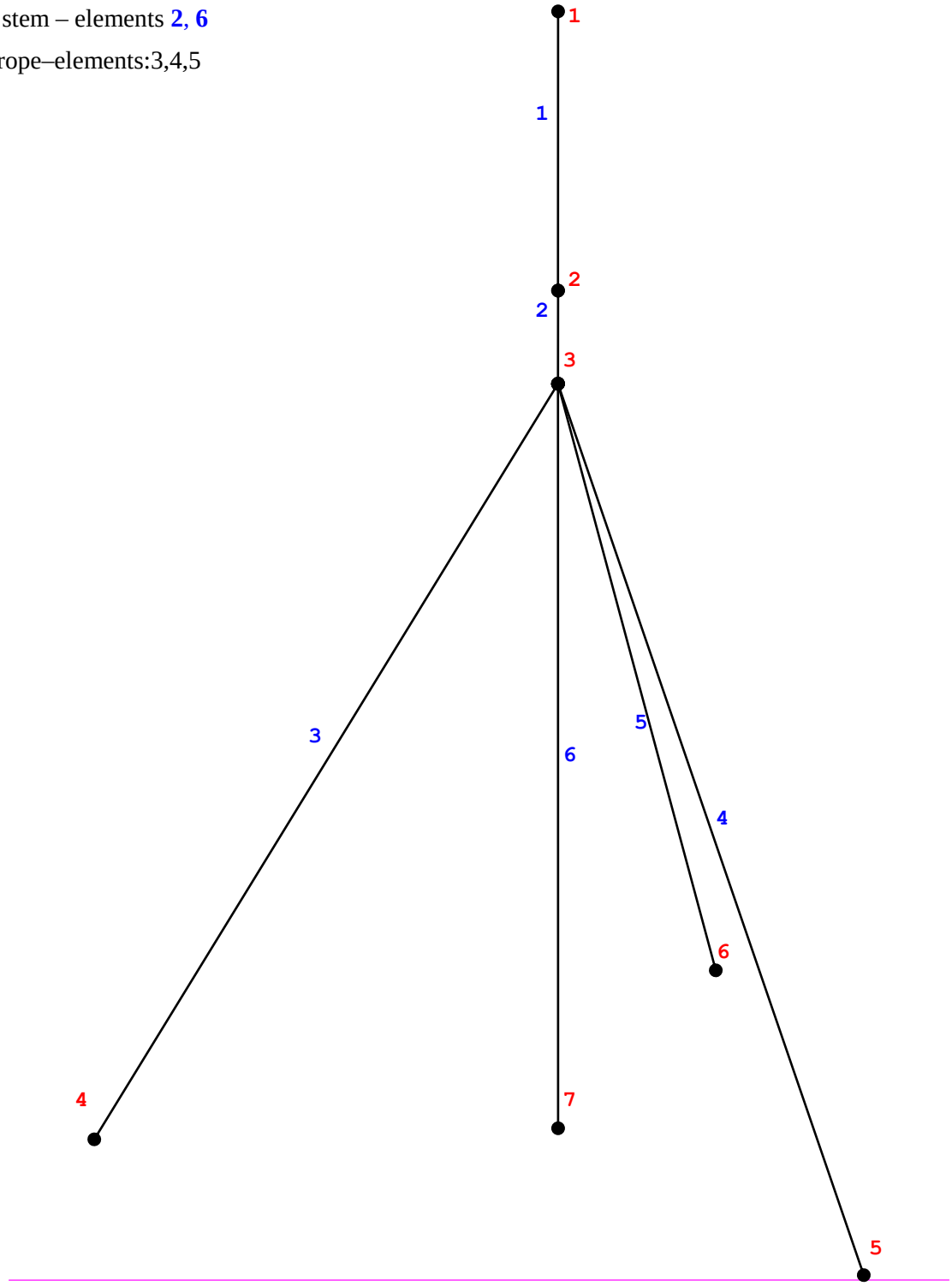
Arch. No.	Area	Sub-area	Doc. No.	Rev. No.	Issue Date	Page	Pages
19322	**90**	**00**	**PR 99009**	**1**	**30.11.13**	**1**	**1**

Grupa LOTOS S.A.	**ENCLOSURE No. 2**	Spec. N°
	Antenna supporting structure	3830

Antenna - element **1** [fixed in node **2**]

Mast stem – elements **2, 6**

Guy-rope–elements:3,4,5



STATIC DIAGRAM, NODES, ELEMENTS - DESCRIPTION

Arch. No.	Area	Sub-area	Doc. No.	Rev. No.	Issue Date	Page	Pages
19322	**90**	**00**	**PR 99009**	**1**	**30.11.13**	**1**	**1**

Grupa LOTOS S.A.	**ENCLOSURE No. 3**	Spec. N° 3830
	Frequency channels used in UHF band	

Item	Transmission frequency [MHz]	Reception frequency [MHz]	User	Description of channel	Notes
1	457,11250	467,11250	PZO, PZH LA_P25, LL	Duosimplex	Interchanged transmission and reception frequencies for base stations
2	457,12500	457,12500	PZH	Simplex	
3	457,13750	457,13750	PZO,EP1,LA	Simplex	
4	457,15000	457,15000	PZO, PEK, PWS, EP2, BE, LS*,LA*	Simplex	
5	457,16250	467,16250	PZP, PWO, PWS, PEK, LS, LL	Duosimplex	Interchanged transmission and reception frequencies for base stations
6	457,17500	457,17500	PZO, EP1, LS_TRE, TD, IP, LS, LL	Simplex	
7	467,12500	467,12500	wszyscy	Simplex	Temporary emergency channel
8	467,13750	467,13750	PZP	Simplex	
9	467,15000	467,15000	PZP, PWO, LS	Simplex	
10	467,17500	467,17500	PZH, BE, LS	Simplex	