

JUGOSLOVENSKE ŽELEZNICE
YUGOSLAV RAILWAYS

413

TEHNIČKI USLOVI
ZA ISPORUKU I UGRADNJI SIGNALNO-SIGURNOSNE I
TELEKOMUNIKACIONE OPREME NA MAGISTRALnim
PRUGAMA JUGOSLOVENSKIH ŽELEZNICA

TECHNICAL CONDITIONS
FOR SUPPLY AND INSTALLATION OF SIGNALING AND
INTERLOCKING AND TELECOMMUNICATION EQUIPMENT ON
MAIN LINES OF THE YUGOSLAV RAILWAYS

B e o g r a d
Maj, 1965. godine
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TEHNIČKI USLOVI

A. SIGNALNO SIGURNOSNI UREĐAJI

i. Opšti uslovi

Signalno-sigurnosna oprema mora u eksploracionom i tehničkom pogledu da ispunjava sledeće osnovne uslove:

1. Da obezbedi odvijanje saobraćaja za maksimalne brzine vožnje do 120 km/h.
2. Da se na ovu opremu mogu dograditi bez većih rekonstrukcija dodatni uređaji koji omogućuju brzine vožnje preko 120 km/h i to:
 - a) za prenos pokazivanja glavnih signala u kabini mašinovođe (uređaji lokomotivske signalizacije);
 - b) za automatsko regulisanje brzina
3. Konstruktivna i šemotehnička rešenja treba da se zasnivaju na primeni savremenih dostignuća tehnike i da omogućuju automatizaciju železničkog saobraćaja korišćenjem najnovijih dostignuća iz oblasti elektronike. Sva ponuđena tehnička rešenja moraju biti u eksploraciji proverena, o čemu ponuđač mora podneti pismeni dokaz železničke uprave kod koje su ova rešenja primenjena.
4. Uredaji za osiguranje stanica, železničkih vozova i drugih službenih mesta, imaju se izvoditi sa šemotehničkim i konstruktivnim elementima na osnovu njihovih slaganja prema geografskom rasporedu kolosečnih postrojenja po mozaik principu, u daljem tekstu „mozaik tehnika“.

Osnovni elementi mozaik tehnike imaju biti izrađeni u vidu standardnih utikačkih grupa (za skretnice, signale, puteve vožnje itd.) koje se međusobno povezuju standardnim utikačkim kablovima po geografskom principu tj. prema kolosečnoj situaciji. Standardne utikačke grupe iste namene (skretnička signalna itd.) imaju biti konstruktivno i šemotehnički jednake, tako da se međusobno mogu zamenjivati.

GENERAL TECHNICAL CONDITIONS

A. SIGNALING AND INTERLOCKING INSTALLATIONS

I. General conditions

The signaling and interlocking equipment have in respect to exploitation, to fulfill the following basic conditions:

1. Provide the traffic at maximum speeds up to 120 km/h.
2. Provide the possibility of adding, without larger reconstructions, the equipment which will at a later stage enable the running speeds over 120 km/h.
 - a) for transfer of signal indications in driver's cab (cab signal equipment);
 - b) for automatic speed control.
3. The construction and schemotechnical*) solutions should be based on the application of modern technical achievements. All the technical solutions offered must have been checked in exploitation, on which the tenderer should submit the written certificate of the railway administration using such solutions.
4. Interlocking equipment for stations, railway junctions, and other operating points, has to be composed of schemotechnical and technical standard units interconnected according to the geographical layout of tracks by mosaic principles, hereafter referred to as "mosaic technique".
The basic elements of mosaic technique have to be constructed in the form of standard plug-in relay groups (for points, signals, routes etc.) which are interconnected by standard plug-in cables according to geographical track layout. The standard plug-in relay groups having the same purpose (for points, signals etc.) have to be the same, both in respect to construction and schemotechnique, so that they can be interchanged.

*) Construction solutions of electric circuits with all necessary interconnections (circuits diagrams).

Postavnice imaju biti takođe izrađene iz mozaik elemenata sa postavnim i pokaznim organima na geografskoj slici kolosečne situacije.

Za velike stanice železničke čvorove sa ranžirnim putevima vožnje standardne utikačke grupe moraju u sebi sadržati i sve elemente za ostvarenje ranžirnih puteva vožnje.

5. Uredaji za postavljanje i kontrolu skretnica moraju biti izvedeni i napajani tako, da se postigne što je moguće veća udaljenost skretnica od postavnice uz primenu maksimalno četiri žile u kablu.

Kod stanice bez ranžirnih signala skretnički likovi moraju biti osvetljeni.

6. Tehničko rešenje napajanja i kontrola signala ima biti takva da se njime omogućuje što veća udaljenost signala od postavnice uz primenu što manjeg prečnika i broja žila u kablu.
7. Mogu se ponuditi i druga tehnička rešenja koja se ne zasnivaju na principu mozaik tehnike. Ova rešenja uzeće se u obzir samo u slučaju ako pružaju znatnija tehnička i eksploataciona preimucevstva u odnosu na rešenja po mozaik principu.
8. Uredaji moraju biti obezbeđeni od ometajućih i opasnih uticaja struje električne vuče.
9. Signalizacija se ima prilagoditi signalnim pojmovima datim u prilogu.

II. Šemotehnički uslovi

1. Šemotehnička rešenja moraju biti takva da je ceo uređaj određen kolosečnom situacijom, bez potrebe za tabelom zavisnosti ili izradom posebnih šema strujnih kola. Strujna kola treba da se oformljuju odgovarajućim povezivanjem relejnih grupa posebno po principu kolosečne situacije.
2. Šemotehničko rešenje mora biti izvedeno da se bez izmene u grupama mogu dodati uređaji automatskog pružnog bloka i telekomande.
3. Ponuđač je dužan da dostavi pregled šemotehničkih kvarova na koje obezbeđuje sigurnosna strujna kola. Šemotehnički kvarovi i smetnje ne smeju da dovedu do ugrožavanja železničkog saobraćaja. Kao neposredno ugrožavanje saobraćaja smatra se, na primer, pogrešno pokretanje skretnice, pogrešno pokazivanje stanja nezauzetosti koloseka i skretnice, pogrešno postavljanje signala u položaj »Slobodno«, prevremeno razrešenje puta vožnje i slično.
4. U šemama se mora računati sa istovremenom pojmom dva šemotehnička kvara ili smetnje iste ili različite vrste.

Control desks have also to be made of corresponding mosaic elements with all controls and indications disposed on the geographical track diagramme.

For large stations and junctions with shunting routes, the standard plug-in relay groups have to include all elements for setting the shunting routes.

5. The equipment for operating of points must be constructed and supplied with power so as to achieve the maximum distance between points and control tower, applying not more than four conductors in cables.
With the stations without shunting signals, the electrical illumination of signal point indicators has to be provided.
6. The technical solution of control of signals and power supplying have to be such as to enable the maximum distance between signal and signal box and using the smallest possible diameter and number of wires in cables.
7. Also other technical solutions can be offered which are not based on the principles of mosaic technique. These solutions will be taken into consideration only in the case they offer better technical and operating advantages in comparison with the solutions according to the mosaic principles.
8. The equipment must be protected from interferences and dangerous influences of the electric traction.
9. Signaling has to be adapted to the signaling system given in the enclosure.

II. Schemotechnical conditions

1. Schemotechnical solutions have to be such that the complete equipment is determined by the track layout without necessity for design of interlocking system or for working out the individual schemes of circuits. The circuits should be formed by the corresponding interconnecting of standard relay groups according to the track layout.
2. The schemotechnical solutions have to be such that the equipment for automatic block and C.T.C. can be added without any alterations, in the standard relay groups. The tenderer must submit the analyses of schemotechnical defects from which the track circuits are protected.
3. The schemotechnical defects and failures must not bring into danger the railway traffic. For instance the wrong setting of points, wrong indications for track and point occupation, wrong setting of signals into position "Clear", early route release etc.
4. The Schemes must take into account the simultaneous occurrence of two schemotechnical defects, or failures of the same or different kind.

5. Pojava šemotehničkog kvara ili smetnja u sigurnosnim strujnim kolima mora da se pokaže odmah ili najkasnije kod prve sledeće manipulacije.
Strujna kola moraju biti zaštićena od ugrožavanja saobraćaja pri pojavi prekida provodnika, međusobnog dodira provodnika, dodira provodnika sa masom i pojave stranog napona.
6. U sigurnosnim strujnim kolima moraju da se primene isključivo sigurnosni releji. Pod signalnim relajima u smislu ovih uslova podrazumijavaju se releji sa prinudnom zavisnošću kontakta tako da ni jedan radni kontakt ne može da se zatvori dok svi mirni kontakti nisu prekinuli i obratno.
7. Prekid strujnog roba ne sme da dovede do nepravilnog razrešenja zabravljenih skretница i puteva vožnje. Po povratku struje mora se pojavitи stanje koje je bilo pre prekida.
8. Tasteri za prinudno razrešenje skretница ili puteva vožnje postavljanje skretница posle presečenja i neispravnog izolovanog odseka, signala i eventualno drugih manipulacija pri kvarovima, moraju biti opremljeni sa posebnim brojačima, pomoću kojih se registruje svako posluživanje ovih tastera.
9. Mora postojati mogućnost individualnog postavljanja skretница sa odgovarajuća dva tastera.
Pri obrazovanju puteva vožnje skretnice se imaju postavljati automatski.
10. Put vožnje ima se obrazovati pritiskom na dva tastera kolosečne slike tabloa, od kojih se jedan odnosi na prugu a drugi na kolosek.
Za pojedine vrste puteva vožnje (ulaz, izlaz, ranžirni put vožnje) imaju se predvideti posebni talasi.
Za puteve vožnje koji se mogu osvrtariti sa više varijanti u voznom delu ili delu puta pretrčavanja, osnovni put vožnje ima se ostvariti pritiskom na dva tastera. Izbor drugih varijanti ima se vršiti prethodnim pritiskom na dva tastera odgovarajuće varijante.
11. Data komanda za obrazovanje puta vožnje mora automatski da se poništi ako nije ostvarena za 30—60 sekundi.
12. Put vožnje pre njegovog zabravljenja može biti opozvan pritiskom na dva tastera. Ova manipulacija se ne registruje. Po zabravljenju puta vožnje prinudno razrešenje ima se ostvariti pritiskom na dva tastera, što ima biti registrovano brojačem.
Investitor određuje stanice koje je ovaj uslov obavezan.
13. Za vraćanje glavnog signala iz položaja »slobodno« u položaj »stoj« u slučaju kakve potrebe, mora se na komandnoj ploči predvideti poseban grupni taster za signal »stoj« koji će imati jednovremeno pritisnuti sa odgovarajućim tasterom signala.
5. When the schemotechnical defect or failure in vital circuits occur, these must appear immediately, or at the first following operation.
Circuits must be protected from bringing into danger the traffic in the case of the conductor breakage, contact between conductors, contact between a conductor and mass and occurrence of extraneous voltage.
6. The interlocking circuits must include exclusively the signal relays. Under signal relays, in the sense of these conditions, are considered the relays with such dependance between contacts that none of the front contacts can be closed before all back contacts are disconnected, and reversely.
7. The circuit interruption must not lead to the incorrect release of locked points and routes. When the circuit is restored the state must be as before the interruption.
8. The push-buttons for emergency release of points or routes, operating of points after trailing through points, and in the case of the incorrect track circuit for signals and occasionally other operations when some defects occur, have to be equipped with special counters, by which each operation of these push buttons is recorded.
9. There must be the possibility of individual operating of points with two corresponding buttons.
When establishing the routes, the points have to be set automatically.
10. The route has to be established by pushing the two corresponding buttons on the track plan panel, one of which is for the line, and the other for the station track.
For different routes (entrance, exit, shunting route) separate buttons have to be provided.
For the routes which can be realized in several variants the train route, or the overlap part, the basic route has to be established by pushing the two buttons. The choice of other variants has to be made by pushing the two corresponding buttons in advance for required variant.
11. The order given for establishing the route must be automatically cancelled if not carried out within 30—60 sec.
12. The route before its locking can be canceled by pushing the two buttons. This operation is not recorded.
After the route has been locked, the emergency route release is to be performed by pushing the two corresponding buttons, which is to be recorded by the counter. The investor specifies for which stations this condition is obligatory.
13. For the emergency setting the main signal back from "Clear" into "Stop" a special common button has to be provided on the control panel for a »Stop« position, which is to be pressed simultaneously with the correspoding signal button.

14. Kod puteva vožnje ulaza mora se predviđeti put pretrčavanja. Pod putem pretrčavanja podrazumeva se deo koloseka koji mora biti slobodan iza signala u položaj »stoj« kada je postavljen za saobraćaj vozova.
15. Svaki put vožnje mora obuhvatiti zaštitne skretnice iskliznice i signale u cilju obezbeđenja od bočnih ugrožavanja. Za stanice kod ulaznih signala bez granice manevrisanja, minimalni put pretrčavanja iznosi 100 m, a sa granicom manevrisanja 50 m.
16. Kod izlaznih signala minimalni put pretrčavanja iznosi 100 m. U pogledu postavljanja skretnica kod manevarskog rada, mogu se predvideti posebne spoljne postavnice na krajevima stanice, ili na mesto ovih mogu se primeniti telefonski ili interfonski uredaji s tim da se ranžirni putevi vožnja postavljaju iz stanične postavnice. Koja će se rešenja primeniti i u kojim slučajevima, određuje investitor.
Investitor će takođe posebno navesti u kojima će stanicama biti primenjeni ranžirni signali sa ranžirnim putevima vožnje.
17. Glavni signal sme da pređe na pojam »slobodno« tek kada se njegov put vožnje obrazovao i zabilježio, kao i kada su slobodni svi odseci puta vožnje, puta pretrčavanja i bočna zaštita.
Kada put vožnje obuhvata više sekcija raznih postavnica ovo važi za sve sekcije tog puta vožnje.
Ukoliko u voznom delu postoji uredaj putnog prelaza, on mora da zauzme položaj zatvorenog prelaza preko pruge.
18. Pozivnim signalom može se rukovati samo pod uslovom da je ulazni signal u položaju »stoj«.
19. Glavni signal mora da pređe na pojam »stoj« nailaskom vozila na sledeći izolovani odsek koji je udaljen najmanje 50 m iza signala.
20. Pozivni signal ima se automatski isključiti kada prođe 30—90 sekundi od njegovog davanja.
21. Kod glavnih signala za »stoj« ili »slobodno« moraju postojati posebni povratni vodovi.
22. Ulazni signali i izlazni signali glavnih prolaznih koloseka moraju imati pomoćnu crvenu svetlost koja se ima automatski uključiti u slučaju izostnka glavne crvene svetlosti.
Kolo pomoćne crvene svetlosti ima se trajno kontrolisati u pogledu ispravnosti rada, a svaki kvar na njemu mora biti alarmiran.
23. Signal sa pojmom »slobodno« mora automatski da pređe na pojam »stoj« ako se neka skretnica elemnta bočne zaštite ili ureneka skretnica puta vožnje preseće, ako daja putnog prelaza tog puta vožnje napusti pravilan položaj ili ako neka kontrola u okviru tog puta vožnje otkaže.
14. For entrance routes the overlap must be provided. Under overlap is understood a part of a track which has to be vacant behind the signal in a "Stop" position, when set for a train.
15. Each route has to include also the points, derails and signals for the purpose of lateral protection. In stations, at entry signals without shunting limit, the minimum overlap is 100 m, and with shunting limit, 50 m.
At exit signals, the minimum overlap is 100 m.
16. For operating the points for shunting operations, separate (outer) control boxes at the ends of the station, or instead of them the telephone sets or talk-back speakers, can be provided, in which case the shunting routes will be established from the central control panel.
The Investor will specify which solutions will be applied, and in which cases.
The Investor will also particularly state in which stations the shunting signals with shunting routes will be used.
17. The main signal may be put into "Clear" position only after formation and locking of the route, as well as when all sections of train route, overlap route and lateral protection are vacant.
If the route includes more sections controlled by different control posts, this applies to all sections of this route.
If there is a level crossing on a train route, this must be closed.
18. In emergency a substitute signal of the entry signal can be operated only when the entry signal is in "Stop" position.
19. The main signal must pass into "Stop" position when a train runs onto the next track circuit which is at least 50 m. behind the signal.
20. The calling-on signal has to be automatically extinguished after 30—90 seconds.
21. The circuits for "Stop" or "Clear" positions of signals must have separate return conductors.
22. The entry and exit signals of main through tracks must have an emergency red light which will be automatically lighted in the case the main red light fails. The emergency red light circuit has to be permanently controlled for reliability of operation, and any defect must be alarmed.
23. The signal must automatically pass from "Clear" into "Stop" position if trailing through point, if any lateral protection point or level crossing installation loses its correct position, or if the control of safety situation within this route fails.

Ponovno postavljanje signala na »slobodno« može se izvršiti jedino ponovnim postavljanjem puta vožnje.

24. Ako pri pojmu »slobodno« nastupi prekid napojne mreže kraći od 2 sekunde, signal ne sme da se prekopča na pojam »stoj«, ako pak izostajanje traje preko 2 sekunde, signal treba da uključi pojam »stoj« a može da pređe na pojam »slobodno« tek po ponovnom davanju ispravne komande.
25. Šeme moraju biti tako izvedne da se signali mogu prekopčati sa dnevnog na noćni napon i obratno bez uticaja na pravilan rad strujnih kola.
26. Veza staničnih signalno-sigurnosnih postrojenja sa uređajem automatskog pružnog bloka mora biti izvedena preko posebnih funkcionalnih grupa tako, da se stanična sigurnosna postrojenja mogu lako povezivati sa ovim uređajima.
27. Konstruktivna rešenja staničnih signalno-sigurnosnih postrojenja imaju biti takva, da smeštaj unutrašnjih uređaja iziskuje što je moguće manje prostora u zgradama.
28. Na komandnoj ploči postavnice moraju biti pokazivani odgovarajućim svetlosnim pokazivačima:
 - a) položaj svih skretница kao i stanje istih u pogledu njihovog blokiranja u sklopu puteva vožnji: zauzetosti od strane vozova; presecanja i eventualno datog ovlašćenja za posluživanje skretница na licu mesta;
 - b) položaj svih signala;
 - c) stanje zauzeća izolovanih odseka;
 - d) stanje obrazovanja, blokiranja, zauzeća i razrešavanja puteva vožnji;
 - e) položaj putoprelaznih branika u rejonu stanice;
 - f) traženje i davanje privola u vezi sa automatskim pružnim blokom i sa međustaničnom zavisnošću za označavanje utvrđenog smera kretanja;
 - g) pokazivanje kvarova i smetnji, koja pokazivanja imaju biti praćena i sa odgovarajućim akustičkim alarmnim signalom. Ovaj akustični signal može biti isključen posle njegove pojave pritiskom na poseban taster pri čemu nesme biti isključen svetlosni pokazivač smetnje i kvara;
 - h) kod stanica koje nisu uključene u automatski pružni blok potrebna je indikacija nailaska voza ispred signala na 80 m.

III. Uslovi za signalne releje

Signalni releji moraju da zadovolje sledeće osnovne uslove:

1. Pokretanje kontakta, odnosno kontaktnih opruga releja mора se obavljati kotovom ili njoj pripadajućim podizačima.

A new setting to "Clear" position, can be carried out only by new establishing of a route.

24. If during the "Clear" position the interruption of current supply, shorter than 2 sec. occurs, the signal must not pass into "Stop" position unless the interruption is longer than 2 sec. It may pass into "Clear" position only after a new correct order.
25. The desings must be such to enable the switching of signals from day to night voltage and reversedly, without causing any troubles in signal circuits.
26. The connection between interlocking installations on one hand and automatic block system on the other, must be made through special relay groups, so that through these the station interlocking installations can be directly interconnected with this equipment.
27. The desing solutions for station interlocking equipment have to be such as to require the minimum room inside a building.
28. The following must be indicated on the control panel by the corresponding light indicator:
 - a) position of all points, their locking state within a route; point occupancies by trains; trailing through points; and eventually given permission for point operating on the spot;
 - b) position of all signals;
 - c) occupancy of track circuits;
 - d) the state of establishment, locking, occupancy and release of routes;
 - e) position of level crossing barriers in the station area;
 - f) reacquiring and giving permits in connection with the automatic block system and interstation dependance installation for fixing direction of movement;
 - g) indications of defects and troubles, which are to be followed by an audible alarm. This audible alarm can be switched off after its occurrence by pressing a corresponding button, after which the light indicator for trouble and defect may be extinguished;
 - h) for stations not connected to the automatic block system, the indication for a coming train is required 80 m in advance of the signal.

III. Conditions for signal relays

Signal relays must meet the following basic conditions:

1. The operating of contacts, ie. of relay contact springs has to be made by armature itself or by a moving contact system.

2. Rele treba da je tako izrađen u pogledu kvaliteta materijala i konstruktivnog rešenja, da besprekorno funkcioniše u temperaturnom opsegu od -10°C do $+15^{\circ}\text{C}$. Kod releja za spoljnu montažu ovaj se opseg proširuje na granice od -40°C do $+70^{\circ}\text{C}$.
3. Konstrukcija releja mora biti takva da bez oštećenja podnosi mehaničke potrese i udare koji redovno nastaju tokom transporta, montaže i eksploatacije.
4. Svi bitni delovi releja moraju biti odgovarajućim postupcima zaštićeni od korozije.
5. Rele treba u normalnom radnom položaju, kod pôtresa vibracijama sinusnih oblika amplitude 1 mm i frekvencije 5–50 Hz još uvek da radi ispravno tj. da se zatvoreni kontakti ne smeju pokrenuti a otvoreni se ne smeju zatvoriti bez obzira da li je kovta releja privučena ili nije.
6. Kod releja koji se vraćaju silom opruge konstrukcija mora biti tako izvedena da se pri izostanku opružne sile releja vrati u mirni položaj.
7. Kod releja sa kombinovanim dejstvom opruge i sile teže, mora vraćanje u mirni položaj uslediti i kod delovanja samo sile teže pojedinačno.
8. Konstrukcija releja mora biti takva da obezbeđuje minimalni vek sigurnog rada releja u iznosu od najmanje 2×10^6 funkcionišanja pod najtežim režimom opterećenja. Ponuđač će dati bliže podatke u ovom pogledu za sve tipove ponuđenih releja. Isto tako on će dati za ove releje i podatke o uslovima mehaničkog ispitivanja ponuđenih releja, kao i o garantovanim rezultatima.
9. Ponuđač je dužan da za svaki od ponuđenih tipova releja, da i faktor kvaliteta releja tj. odnos između električnih elemenata za privlačenje i otpuštanje kontakta releja (odnos između struje otpuštanja i struje privlačenja itd.).
2. The relay should have been manufactured, in respect with quality of material and design, so that it works perfectly within the temperature range from -10°C up to $+15^{\circ}\text{C}$. With relays which have to be installed in the open, this range increases to the limits from -40°C up to $+70^{\circ}\text{C}$.
3. The construction of relays must be such to bear without any damage all mechanical shakes and shocks which normally accompany the transport, installation and operation.
4. All relay essential parts must be protected from corrosion by corresponding treatments.
5. In its working position a relay has to work correctly when shaken by sine vibration of amplitude and 5–50 c/s of frequency; i.e. the closed contacts must not disconnect, and the open ones must not close regardless of whether the relay is picked up or released.
6. Relays which are brought back by spring force, must be of such construction that the relay is brought into back position in case the spring force fails.
7. If relays combine the action of spring and gravitation, bringing into back position must occur also by individual action of gravitation.
8. The relay design has to be as to provide the minimum period of normal operation and to stand at least 2×10^6 functions under the heaviest loading. The Tenderer will specify the data in this respect for all types of offered relays. He will also give the data on conditions for mechanical testing of the offered relays, as well as the guaranteed results.
9. The Tenderer is obliged to give for each of the offered relays the quality factor of the relay, i. e. the relation between the electrical components for attraction and release of relay contacts (relation between releasing and attracting current etc.).

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o izmjenama i dopunama Tehničkih uvjeta za isporuku i ugradnju signalno-sigurnosne i telekomunikacione opreme na magistralnim prugama Jugoslavenskih željeznica

1. U Tehničkim uvjetima za isporuku i ugradnju signalno-sigurnosne i telekomunikacione opreme na magistralnim prugama Jugoslavenskih željeznica, izdanje Jugoslavenskih željeznica Beograd, svibnja 1965. godine, u poglavljiju A. točka III pod 10. mijenja se i glasi:

»Izolacija između pojedinih namotaja jednog kabela i između svakog namotaja i ostalih dijelova mora izdržati probajni napon od najmanje 750 V, 50 Hz, tijekom jedne minute.

Izolacija između ostalih izoliranih dijelova (kontaktnih pera, priključnica i dr.) mora izdržati probajni napon od najmanje 2000 V, 50 Hz u vremenu od jedne minute.

Pod najnepovoljnijim uvjetima vlažnosti i temperaturе minimalni jednosmerni ispitni napon iznosi 500 V.«

Optor izolacije, potpune šemirane postavnice kako između priključnica i mase, tako i međusobno između priključnih kola može biti različit u ovisnosti o veličini kolodvora, no ne smije biti manji od $220 \text{ k}\Omega$, nakon priključenja kabelskih veza.

Kod uzemljenih sistema signalno-sigurnosnih uređaja ova vrijednost otpora izolacije treba da imaju strujna kola koja u sistemu nisu uzemljena.

2. U istom poglavljiju točka IX »Tehnički uvjeti za osiguranje putnih prijelaza« zamjenjuje se novim »Tehničkim uvjetima za osiguranje putnih prijelaza u nivou koji se objavljaju u posebnom izdanju.

3. Ova odluka stupa na snagu osmog dana od dana objavljivanja u »Službenom glasniku Zajednice JŽ«.

ZJŽ br. 6110/71

Predsjednik Skupštine ZJŽ,
Jože Predikaka, v. r.

11. Kontaktni materijal relea treba da je teško zavarljiv, da zadržava dobru električnu provodljivost i kod pojave oksidnog sloja, te da je oštećenje i deformacija kontaktnih glavica nastale usled dejstva električne varnice pri kontaktiranju što manje.
12. Opasnost zavarivanja kontakta treba da je umanjena konstruktivnim merama, kada to sklop relca dopušta, kao što su zajedničko vodenje kantakta, male sopstvene vibracije,
11. The materials used for relay to be non-weldable, to retain conductivity even with a film that the damage and deform studs caused by electric arc least possible.
12. The danger of contact welding has been diminished by design construction allows it, such as of contacts, small self-vibrations

- kontaktnih opruga kod prekopčavanja, jaka povratna sila i slično.
13. Kontakti releja imaju biti u principu izrađeni sa potrebnim kontaktnim pritiskom od najmanje 20 grama i moraju obezbeđivati potreban međusobni minimalni razmak koji uslovjava ponuđeni tip releja. Po red toga mora biti obezbeđeno čišćenje kontakta trenjem pri njihovom radu. Najveći dozvoljeni prelazni otpor na kontaktu treba da je oko 5 ohma.
- Mora biti obezbeđeno i vraćanje u osnovni sigurnosni položaj silom gravitacije (sa ili bez kombinacija sa povratnom oprugom).
14. Vreme sopstvenih vibracija kontakta kod prekopčavanja nesme, biti veće od 10 ms. Ovo vreme se meri u trenutku otpuštanja releja, pošto je po pravilu veće nego kod privlačenja.
15. Materijal od koga su načinjeni pojedini delovi kontaktog mehanizma ne sme biti zapaljiv niti podložan abanju.
16. Ako jedan radni kontakt ostane usled zavarivanja pri otpuštanju releja zatvoren, drugi radni kontakti treba da se otvore dok se mirni kontakti pri tome nesmeju zatvoriti. Kada mirni kontakt koji obavlja sigurnosnu funkciju ostaje kod privlačenja kote zatvoren, radni kontakti istog releja nesmeju zatvoriti niti kod povećanja struje na 1,5 vrednosti od nominalne.
17. Ponuđač je dužan da dostavi sve tehničke podatke sa karakteristikama ponuđenih releja.
13. In principle, the relay contacts have to be made with a necessary contact pressure of at least 20 g and to have the minimum opening required for the offered type of relay. Furthermore, the cleaning of contacts must be provided by friction in the moment of their closing. The maximum permitted resistance on the contact should be about 5 m ohms.
- Also the possibility of bringing back to the basic position by gravity (with or without combination with release spring) must be provided.
14. The time of contact self-vibrations when switching must not exceed 10 ms. This time is measured at the moment of relay release.
15. The material from which the different parts of contact mechanism are made must be inflammable and subject to wear.
16. If one of front contacts remains closed due to welding at relay release, other front contacts should be opened, and the back contacts must not close. When the back contact which has the safety function remains closed attraction of the armature, the front contacts the same relay must not be closed over if the current is increased up to 1,5 of the nominal value.
17. The Tenderer is obliged to submit all the technical data and the description of the offered relays.

IV. Uređaji za napajanje

1. Uređaji za napajanje staničnih signalno-sigurnosnih postrojenja potrebnom električnom energijom, imaju biti izvedeni tako, da obezbede trajno funkcionisanje uređaja bez ugrožavanja i ometanja odvijanja saobraćaja. Kao osnovni izvor električne energije za rad napojnog uređaja stoji na raspoređenju u svakoj stanici priključak na trifaznu distribucionu mrežu 380/220 V, 50 Hz.
2. Stanični napojni uređaji moraju biti tako dimenzionisani i izgrađeni da se iz istih vrši napajanje uređaja automatskog pružnog bloka i putnih prelaza. Napajanje pružnih postrojenja ima se vršiti preko posebnih izvora na napojnom sistemu, preko posebnih napojnih pružnih kablova kao i sa odgovarajućom frekvencijom potrebnom za rad signala, izolovanih odseka i relejnih zavisnosti. U ponudi treba detaljno obrazložiti i opisati ponuđeni sistem napajanja pružnih postrojenja.
- Napojni uređaj mora biti tako dimenzioniran i izведен da napaja i telekomunikacione uređaje i da se na isti može lako priključiti i potreban sistem napajanja za telekomunikacioni uređaj.

IV. Feeding installation

1. The equipment for supplying the station signaling and interlocking installations with necessary electric power have to be such as to provide the continuous functioning of the installations without any disturbances or interruptions of the traffic. The basic source of the electric power for a correct functioning of feeding installation is a connection to the threephase 380/220 V, 50 c/s local distribution system.
2. The station feeding installation must be designed to be able to supply automatic block systems and level crossing equipment. The track facilities shall be supplied through separate branches in the feeding system, by special local cables and providing the frequency required for signals, track circuits and relays operation. The tender should in detail explain and describe the offered system of line facilities supplying.

The feeding installation has to be designed so to supply the telecommunication equipment as well, and so that a CTC feeding system can be supplied by it.

3. Napajanje uređaja iz distribucione mreže treba da se vrši preko izolacionih transformatora.
 4. Uredaj za napajanje treba da obezbedi sigurno napajanje koje garantuje normalan rad uređaja pri varijacijama nominalnog napona u distribucionoj mreži za $\pm 10\%$.
 5. »Pri nestanku napona u elektrodistributivnoj mreži ili promjeni napona izvan dozvoljenih tolerancija, potrebno je predvidjeti rezervno napajanje svih uređaja.
Reservno napajanje mora biti osigurano iz dva neovisna izvora. Za jedan izvor treba koristiti AKU bateriju sa odgovarajućim pretvaračima a za drugi izvor diesel agregat.
Kapacitet AKU baterije treba predvidjeti tako da zadovoljava minimalno 60 minutni rad uređaja, a rad diesel aggregata mora osigurati neprekidno napajanje uređaja od najmanje 24 sata bez dolijevanja pogonskog goriva.«
 6. Prelaz sa napajanja iz distribucione mreže na rezervno i obratno ili sa jednog rezervnog izvora na drugi, treba da bude automatski i nesme da uzrokuje promene postojećeg stanja na uređaju.
 7. Za rad dizel aggregata predvideti mogućnost uključenja-isključenja sa postavnice kao i ručnog stavljanja dizel aggregata u pogon na licu mesta.
 8. Napojni uređaji treba da imaju spoljni prikupljač za prikopčavanje pokretnog aggregata za rezervno napajanje.
 9. U određenim slučajevima investitor može da odredi da kao rezervni izvor napajanja služi samo akumulatorska baterija sa pretvaračima bez stacioniranog dizel aggregata. U ovom slučaju kapacitet akumulatorske baterije treba da bude za osmočasovno napajanje uređaja.
Koјi će napojni uređaji biti izvedeni na ovaj način, navešće investitor u uslovima za svaku deonicu.
 10. Potrebno je da se alternativno ponudi napojni uređaj kod koga će kao rezervni izvor napajanja umesto dizel aggregata da se primeni uređaj za napajanje iz kontaktanog voda električne vuče.
 11. U slučaju izostanka i redovnog i rezervnog napajanja potrebno je obezbediti napajanje crvenih signalnih sijalica za period od 8 časova. Poželjno je da se ovo napajanje vrši direktno iz akumulatorske baterije.
 12. Napajanje signalnih sijalica treba da je tako izvedeno da je moguće regulisanje napona za osvetljenje dan-noć.
 13. Kod napajanja pokazanih sijalica predviđeti mogućnost podešavanja jačine osvetljenja.
 14. Napojni uređaj mora biti tako izведен, da kvar pojedinih elemenata što manje utiče na siguran i bezbedan rad uređaja u celini.
3. The feeding of installations from the basic distribution system should be through sectioning transformers.
 4. The feeding arrangement should provide a reliable supplying of power to provide a normal operation of station facilities, with the nominal voltage variations in the local distribution network within $\pm 10\%$.
 5. A potential interruption in the local distribution network, or changes in potential above or below the rated limit, the emergency supply should be provided from two separate sources. One is the accumulator battery with the corresponding rectifiers, and the other a Diesel aggregate.
The capacity of batteries should be sufficient for three hours' work of the feeding installation, and the aggregate should provide the continuous feeding for 24 hours, without necessity for adding the fuel during this period.
 6. The switching from distribution network over to the emergency supplying and vice versa or from one emergency source to the other should be automatic and must not cause the change in the reliable operation of the equipment.
 7. Also the possibility of switching on and off the diesel aggregate from the control post should be provided, as its manual starting on the spot.
 8. The feeding installation should have the outer connectors to the mobile emergency aggregate.
 9. In the specified cases the Investor may determine to use as an emergency power supply only accumulator battery with rectifiers, without a fixed diesel aggregate. In this case the capacity of the accumulator battery should be sufficient to feed all installations during eight hours.
The Investor will specify in the conditions for each section which feeding arrangements will be constructed in this way.
 10. It is necessary to offer alternatively the feeding equipment which will be used as an emergency power supply instead of the diesel aggregate from the catenary.
 11. In case both normal and emergency power supplies fail, the feeding of red signal lamps must be provided for the 8 hours' period. The direct feeding from the accumulator battery is most convenient.
 12. The feeding of signal lamps should be such as to enable the voltage regulation both for day and night lighting.
 13. For indicator lamps feeding, the possibility of adjusting the light intensity has to be provided.
 14. The components through which different parts of the equipment are fed must be installed in the feeding equipment so that defects of individual components do not cause any trouble to the functioning of the whole equipment.

15. Ako se za redovno napajanje pojedinih delova uređaja upotrebljavaju pretvarači, svaki pretvarač mora imati svoj rezervni pretvarač koji će se u slučaju kvara osnovnog pretvarača automatski uključivati.
16. Ispravljači za punjenje akumulatorskih baterija moraju biti predviđeni za dopunjavanje i brzo punjenje.
17. Za ponudene napojne uređaje treba dati detaljan opis funkcionisanja sa principijelnim šemama. Takođe je potrebno dati tehničke karakteristike pojedinih sastavnih elemenata i referenze.
15. If converters are used for the regular feeding of different parts of the equipment, each converter must have its emergency converter which will automatically switch on in case the main converter fails.
16. Rectifiers for charging the accumulator batteries must be provided for fast re-establishment of normal capacity.
17. A detailed description of functioning with principal schemes is required for the offered feeding arrangements. Also the technical features of different components and the corresponding references are required.

V. Šinska strujna kola

1. Šinska strujna kola moraju pouzданo da rade pri uslovima električne vuče naizmeničnom strujom 25. kV, 50 c/s, ili jednosmernom strujom vuće 3000 V. Investitor daje podatke o vrsti vuče za svaku deonicu.
2. Sa otporom izolacije kolosečnog odseka u šinskom strujnom kolu ima se računati sa specifičnim otporom izolacije od 1,6 oma po kilometru na otvorenoj pruzi a 1 om po kilometru u staničnom rejonu.
Maksimalni otpor premošćenja (kratka veza između šina kolosečnog odseka) sa kojim se ima računati za pouzdani rad šinskog strujnog kola iznosi 0,5 oma.
Kolosečno rele šinskog strujnog kola mora imati faktor dobrote njamanje 0,65.
3. Šinska strujna kola u stanicama od ulaznog do ulaznog signala imaju se izvesti sa jednošinskom izolacijom.
4. Za skretnice u stanicama u principu ima se predviđeti posebna redna izolacija za svaku skretnicu pojedinačno, ukoliko investitor nije posebno zahtevao zajedničku izolaciju za određene grupe skretnica u pojedinim stanicama.
5. U sklopu šinskih strujnih kola imaju se ponuditi svi ostali potrebni sastavni elementi kao što su: izolirani šinski sastavi, kablove, priključne glave sa transformatorima, šinski prevezovi, kolosečne prigušnice i drugo. Alternativno imaju se ponuditi lepljeni izolovani šinski sastavi (metalni, ili druga slična rešenja).
Za izolovane šinske sastave potrebno je da ponudač podnese ateste.
6. Podatke o tipovima šine skretnice daje investitor za svaki konkretni slučaj.
7. Kolosečne prigušnice na izolovanim sastavima imaju biti dimenzionirane za naizmeničnu struju vuće 700 A, a za jednosmernu struju vuće 1000 A.

VI. Skretničke postavne sprave

1. Jugoslovenske železnice na predviđenim prugama koje ulaze u program modernizacije, raspolažu sa skretnicama S-45 i S-49. Bliže podatke o vrstama skretnica i njihovo

V. Track circuits

1. Track circuits must operate reliably under conditions of A. C. electric traction 25 kV, 50 c/s, or D. C. traction 3000 V. The Investor gives data about the type of traction for each line.
2. The specified resistance of insulation in a track circuit which is to be taken into account is 1.6 Ohms/km on the open line, and 1 Ohm/km in the station area.
The maximum shunt resistance (a short circuit between rails through axles) required for reliable operation of track circuit is 0.5 Ohms.
The minimum quality factor of the track circuit relay must be 0.65.
3. The track circuits in stations from entry to entry signals have to be installed with a single rail insulation.
4. For each separate point in stations the series insulation must be provided if the investor has not especially required the common insulation for determined groups of points in different stations.
5. The tender for track circuits must also include all other components as: insulated rail joints, cable connecting boxes with transformers, rail bondings, impedance bond etc. Alternatively track joints insulated by metaline or other similar materials can be offered. The Tenderer is required to submit the documentation and certificates for the insulated rail joints.
6. The data on point and rail types will be supplied by the Investor for each individual case.
7. The track impedance bonds for insulated joints have to be rated for 700 A. A. C. traction, and for 1000 A. D. C. traction.

VI. Electric switch point machines

1. On the lines included in the Modernization plan, the Yugoslav railways have type S-45 and type S-49 points. The details on types of points and their application on different

- voj raspodeli na pojedinim službenim mestima daje investitor.
2. Skretnice tipa S-45 i S-49 opremljene su sa spoljašnjim strelastim zatvaračima, pa prema tome skretničke sprave imaju se ponuditi za ovakav tip skretnica.
Pored ovoga mogu se ponuditi i tehnička rešenja sa zabravljenjem unutar postavne sprave, za koji slučaj se mora dati alternativna ponuda.
 3. Skretničke postavne sprave moraju biti prerezive i reversibilne.
 4. Postavna sprava ima biti izgrađena tako, da se sila postavljanja skretnica (merena na poteznoj moci) može regulisati od 250—600 ker. U pogledu sile presecanja mo-

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o izmjenama Tehničkih uvjeta za isporuku i ugradnju signalno-sigurnosne i telekomunikacione opreme na magistralnim prugama Jugoslavenskih željeznica.

Clan 1.

U Tehničkim uvjetima za isporuku i ugradnju signalno-sigurnosne i telekomunikacione opreme na magistralnim prugama Jugoslavenskih željeznica (izdanie jugoslavenskih željeznica Beograd, svibnja 1965. godine), u poglavljiju A toč. VI, u odredbi pod 4) druga rečenica mijenja se i glasi:

»Skretnička postavna sprava za skretnice tipa 49 i druge skretnice sa jezićima građenim od zvonastog profila, te za skretnice tipa 45 i druge skretnice sa jezićima građenim od tračničkog profila mora biti tako izgrađena da sila presečenja iste bude manja od 1000 kp i najmanje 100 kp veća od sile postavljanja postavne sprave za dotičnu skretnicu.«

Clan 2.

Ova odluka stupa na snagu osmog dana nakon objave u »Službenom glasniku Zajednice JŽ.«

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VII. Stanični signalno-sigurnosni kablovi

1. Signalni kablovi se imaju isporučiti sa izolacijom i omotačem od PVC mase.
2. Provodnik: okrugla bakarna meko odžarena žica odgovarajućeg prečnika potrebnog prema tipu uređaja.
3. Izolacija: od termoplastične mase.
4. Jezgro kabla:
Žile použene koncentrično u jezgro kabla. Između slojeva treba da bude postavljena i jedna termoplastična traka a preko zadnjeg sloja najmanje jedna termoplastična traka sa preklapanjem.
Sistem obeležavanja žila mora biti dostavljen od strane proizvođača.
U cilju zaštite od glodara i insekata, jezgro kabla obaviti metalnom trakom od 0,3 mm sa zazorom između navoja od približno 2 mm.

operating posts will be supplied by the investor.

2. The types S-45 and S-49 of points, are equipped with outer »clamp« locking devices, thus the point machines have to be offered for this kind of points.
Besides this, also the technical solutions with the locking inside the point machine can be offered, in which case the alternative Tender can be forwarded.
3. The point machines must be trailable and reversible.
4. The point machine has to be constructed so that the point setting force (measured at the control rod) is to be rated from 250—400 kg.

5. The point machine must be adjusted so as to enable the manual operating of crank handle. While applying the crank handle the feeding of control and proving circuits must be automatically re-established.

6. The Tenderer for point machines must also include all assembly parts necessary for fixing and connecting the point machine to the point, such as: operating and controlling rods parts for mounting the machine on the point and all necessary insulation, as well as the connection with the signal point indicator and its electric lighting equipment.
7. The Tenderer is obliged to submit:
 - technical description of point machines
 - basic technical and operating characteristics,
 - the system of connecting the point machine to the point with assembly drawings.

VII. Cables for station signaling and interlocking installations

1. Cables for this purpose will be supplied with PVC insulation and sheathing.
2. Conductors: round wire made from corresponding copper 0.9 and 1.4 mm dia respectively, according to the system of equipment and situation on the site.
3. Insulation: thermoplastic mass.
4. Cable core: Conductors are to be drilled concentrically in the cable core. A thermoplastic band should be placed between the layers, and over the top layer at least one thermoplastic band with lapping ends.

The manufacturer must submit the system of conductors marking.

For the purpose of protection from rodents and insects, the cable core should be wound with 0.3 mm metal band, with an approximate spacing of 2 mm between windings.

5. Omotač: Preko metalne trake postaviti PVC omotač crne boje.
6. Radni kapacitet kablova sa prečnikom provodnika 0,9 mm nesme biti veći od 180 nF/km, za kableove sa prečnikom provodnika 1,4 ne veći od 210 nF/km.
7. U svim ostalim detaljima ovi kablovi moraju zadovoljiti zahteve VDE 0816/6.64 tabela 1.
8. Uz signalne kableove ima se ponuditi i potreban kablovski pribor.

VIII. Automatski pružni blok

Uredaj automatskog pružnog bloka mora biti konstruisan i izведен tako da zadovoljava sledeće uslove:

1. Deobom staničnih razmaka na potreban broj blokovnih odseka mora biti omogućeno potpuno bezbedno kretanje 2 ili više uzastopnih vozova u jednom staničnom razmaku. Broj i raspored prostornih odseka daje investitor posebno za svaki odsek pruge.
2. Na dvokolosečnim prugama, uredaj automatskog pružnog bloka mora biti izведен za kretanje vozova u jednom smeru, a na jednokolosečnim prugama za kretanje u oba smera po jednom istom koloseku.
3. Na jednokolosečnim prugama mora biti tehnički obezbedena promena smera kretanja od strane otprovnika vozova dveju susednih stanica.
4. U staničnim uređajima za dati smer kretanja mora biti pokazivano stanje zauzetosti svakog blokovnog odseka i smetnja na svakom blokovnom signalu. Ova stanja i smetnja pokazuju se u stanicama na jednokolosečnoj pruzi u smeru kretanja voza.
5. Signali automatskog pružnog bloka za utvrđeni smer vožnje moraju biti međusobno u takvoj zavisnosti, da je na svakom od ovih signala predsignalisan položaj nadnog prostornog ili staničnog ulaznog signala, odnosno stanje zauzetosti dvaju nadnih blokovnih odseka iza signala. Na jednokolosečnim prugama svi prostorni signali moraju biti uvek osvetljeni za jedan smer vožnje.
- Prostorni signal ispred ulaznog signala suprotog smera mora biti osvetljen.
- Na dvokolosečnim prugama signali automatskog pružnog bloka moraju biti trajno osvetljeni.
6. Signali automatskog pružnog bloka imaju se automatski postavljati u položaj »stoј« kada čelo voza pređe put od 50 m iza signala (put pretrčavanja).
7. U slučaju gašenja crvene svetlosti mora se automatski paliti pomoćna crvena svetlost, za koju svrhu treba predvideti poseban izvor napajanja sa kapacitetom za osmočasovno pomoćno napajanje.

5. Outer sheathing: Over the metal band, place a black PVC sheath.
6. The capacitativity of cables with conductor diameter of 0.9 mm must not exceed 180 MF/km, and for cables with conductor diameter of 1.4 mm, 210 MF/km.
7. In all other details, these cables must meet the requirements of VDE 0816/6.64, Table 1.
8. Also all necessary cable accessories are to be offered together with the signal cables.

VIII. Automatic block system

The design of the automatic block system must meet the following conditions:

1. By dividing of interstation spaces into corresponding number of block sections, a completely safe movement of two or more successive trains in one section between two station must be provided. The number and division of spacings between stations are specified by the Investor for each line separately.
2. On double track lines, the automatic block system must be such to enable the movement of trains in single direction, and on single track lines in both direction along the same track.
3. On single track lines, changes of direction of movement must not be technically possible without agreement of the station inspectors.
4. The state of each block section occupancy for a given direction of movement must be indicated on the control desk, as well as the disturbance at each block singal. These conditions and disturbances are indicated in the single line stations in direction of train movement.
5. The signals of the automatic block system for a fixed movement direction must be in such inter-dependance, that each of these block signals indicates the position of the following block signal, or station entry signal, and the state of occupancy of the two following block sections behind the signal, respectively.
On single track lines, all block signals must be always lighted for one determined direction. The block signal in front of the entry signal of opposite direction must be lighted. On double track lines, all automatic block signals shall be permanently lighted.
6. The signals of the automatic block system must be automatically set into »Stop« position when the head of the train runs 50 m. behind the signal (the overlap).
7. In case the red light fails, the emergency red lamp must be automatically lighted, for which purpose an emergency red lamp must be automatically lighted, for which purpose an emergency feeding source sh-

Šemotehnički ima biti obezbeđeno i to, da se u slučaju gašenja zelene svetlosti automatski pali žuta, a u slučaju gašenja žute ima se automatski pojaviti crvena svetlost. Sijalice za zelenu, žutu i crvenu svetlost moraju imati duplo vlakno.

8. Uređaj automatskog pružnog bloka ima biti izведен primenom šinskih strujnih kola. Šinska strujna kola moraju obezbediti trajan i siguran rad automatskog pružnog bloka, tj. da se na prostornim signalima pouzdano pokazuje stanje zauzeća pojedinih prostornih odseka, računajući pri tome sa maksimalnom dužinom od 1800 m po odseku, pri minimalnom otporu zastora od 1,6 oma/km, računajući sa maksimalnim otporom premošćenja od 0,5 oma.
 9. Ponuđač je dužan da dostavi ponudu za dvošinske izolovane odseke za uređaje automatskog pružnog bloka. Pored toga mogu se ponuditi i izolovani odseci sa jednošinskom izolacijom.
 10. Uređaj automatskog pružnog bloka ima biti izведен tako, da je potpuno obezbeđen od ugrožavajućih i opasnih uticaja povratne struje vuće i kontaktne mreže.
 11. Napajanje uređaja automatskog pružnog bloka ima se vršiti iz obe susedne stанице preko posebnog napojnog kabla. Pri ovome sistem napajanja ima biti takav, da se sa njim može postići što veći domet sigurnog napajanja uz što manji presek napojnog kabla.
 12. Tehničkim rešenjem uređaja automatskog pružnog bloka ima biti obezbeđen i prelaz sa dnevног на ноћно напајање светлосних signala i obratno.
 13. Ako se kod automatskog pružnog bloka iz bilo kojih razloga ne mogu primeniti šinska strujna kola, mogu se ugraditi uređaji brojača osovina.
Na kojim deonicama će se ugraditi brojači, odrediće investitor.
 14. Uređaj brojača osovina mora zadovoljiti tehničke i sigurnosne uslove kao i odgovarajući uređaj sa šinskim strujnim kolima.
 15. Uredaj brojača osovina mora da udovolji još i sledećim tehničkim uslovima:
 - da radi pouzdano kako za maksimalne brzine vožnje, tako i kod vozova koji su zaustavljeni ili su u pokretu;
 - da je njegov siguran rad nezavisan od varijacije pogonskog napona;
 - da ispunjava opšte sigurnosne uslove (eventualna pojava kvara mora da bude odražena na ostvarenju uslova veće sigurnosti);
 - da reaguje nezavisno od vrste materijala zastora (drveni, betonski i gvozdeni pragovi), od vrste i svojstva točkova (prečnika, blok ili sa špicama, metalni toč-
- uld be provided, with capacity for eight hours emergency feeding.
Also it has to be provided that in case the green light extinguishes the yellow one is lighted automatically, and in case the yellow light extinguishes, the red one must be lighted automatically.
The lamps for green, yellow and red lights must have two filaments.
8. The automatic block section arrangement has to be designed for application of track circuits.
The track circuits must provide the continuous and reliable operation of the automatic block system, i. e., that on block signals the state of different space sections is reliably indicated, taking into consideration the maximum length of 1.800 m per section but with minimum ballast resistance of 1.6 ohms/km, counting upon the maximum shunting resistance of 0.5 ohms.
 9. The Tenderer is obliged to offer automatic block system with a double-rail insulation of track circuits.
Besides these also the track circuits with single, rail insulation can be offered.
 10. The automatic block section system must be such, that it is completely protected from disturbing and dangerous influence of return traction current of the catenary.
 11. The feeding of the automatic block system has to be performed from both neighbouring stations, through a special feeding cable along the line. The feeding system must be such that the maximum target of proper feeding is reached, using the minimum cross section of conductors in the feeding cable.
 12. The technical solution of the automatic block system must provide the safe switching from day to night tension of light signals and vice versa.
 13. If for any reason the track circuits cannot be used with the automatic block system, the axle counters may be offered.
The Investor will specify on which sections the counters will be installed.
 14. The axle counting system must fulfill the same technical and safety conditions, required for the solution with track circuits.
 15. The axle counting system must also fulfill the following technical conditions:
 - to operate reliably both at maximum running speeds and with trains moving slowly or standing still,
 - that its reliable operation is not dependent on the variations in rated voltage;
 - to satisfy the general safety conditions (the eventual defect occurrence must result in the realization of the higher safety conditions);
 - to react independently on the kind of ballast material (wooden, concrete and iron sleepers), on the kind and property of wheels (diameter, ingot or with spo-

- kovi iz nepermeabilnog materijala, stepena istrošenosti), kao i od bočnih pomeranja točkova na šine;
 - da nijedan drugi metalni deo vozila (izuzimajući točkove) kao što su viseće cevi, lanci, magnetne kočnice, ne izaziva dejstvo uređaja;
 - da je neosetljiv na uticaj stranih polja (proizvedena usled povratne struje vuče na elektrificiranim prugama, magneta na vozilima, točkova sa remanentnim magnetizmom kao i na mehaničke potrese šina (vibracija šina);
 - da neometano radi pri vremenskim uticajima (temperatura, voda, sneg, led);
 - u cilju povećanja trajnosti uređaja i smanjivanja troškova održavanja, pokretni delovi uređaja imaju se svesti na najmanju meru;
 - da ostvari mogućnost daljinskog napajanja uz što moguću nižu porošnju električne energije;
 - da se može jednostavno ugradjivati bez većih radova na prilagođavanje uređaja kao i bez znatnijih radova na gornjem stroju, pri čemu se uređaj mora nalaziti van gradnica slobodnog profila.
- . Za uređaj brojača osovina moraju se dostaviti princip šeme za razne slučajeve primene uz naznačenje potrebnog broja kablovskih žila za rad uređaja, sa naznačenjem svrhe pojedinih parica.
- . Sem uređaja brojača osovina, mogu se ponuditi i druga tehnička rešenja koja nisu u ovim uslovima pomenuta. Oni moraju zadovoljiti napred pomenute uslove koji se odnose na šinska strujska kola i uređaje brojača osovina. Ova rešenja moraju biti u eksploraciji proverena, pri čemu ponuđač mora podneti pismeni dokaz železničke uprave, na čijoj su teritoriji primenjena takva rešenja.
- . Za sva tehnička rešenja koja se odnose na uređaj automatskog pružnog bloka, ponuđač mora dostaviti tehničke opise šeme, tehničke i eksploracione karakteristike uređaja.
- . Na prugama na kojima nije predviđen automatski pružni blok imaju se ponuditi uređaji za prinudno ostvarenje zavisnosti između susednih stanica u pogledu odvijanja saobraćaja u staničnom razmaku — uređaji međustanične zavisnosti. Tehničko rešenje ovakvog uređaja ima biti takvo, da izlaz nekog voza iz stanice na otvorenu prugu može biti pokazan na izlaznom signalu samo ukoliko su zadovoljeni sledeći uslovi:
- a) da je putem ovog uređaja električno ostvaren sporazum između otpravnika

- kes, metal wheels from impermeable material, rate of wear), as well as on the lateral displacement of wheels;
- that no other metal part of the vehicle (except wheels) such as suspended pipes, chains, magnetic brakes, operates the equipment;
 - to be unaffected by the influence of fields caused by extraneous interferences (due to return current of the electric traction, magnets on vehicles, wheels with remanent magnetism as well as mechanical rail displacement (rail vibrations);
 - to operate properly under all weather conditions (temperature, floods, snow ice);
 - for the purpose of increasing the durability of the equipment and decreasing the maintenance costs, the number of mobile parts of the equipment will be minimum;
 - to realise two possibility of long distance power supply, with the minimum consumption of the electric power;
 - to enable its simple installation without complicated work on adapting the equipment, as well as the considerable work on the track superstructure; the equipment must always be outside the clearance limit.
16. For the axle counting the principal schemes for different cases of application must be submitted, stating the necessary number of cable conductors for the equipment operation, and also the purpose of each conductor.
17. Beside the axle counting equipment, some other technical solutions may be offered not mentioned in these conditions. They must satisfy the same conditions regarding the track circuits and axle counters. These solutions must have been checked under exploitation, on which the tenderer must submit the certificates of railway administrations applying such solutions.
18. For all technical solutions regarding the automatic block system, the Tenderer must submit the technical descriptions, schemes, technical and operation characteristics.
19. On the lines without automatic block system, the installation of an electric interdependance between neighbouring stations for the purpose of regulating the traffic is to be offered. The technical solution of such equipment has to be constructed so that the exit of a train from the station can be indicated on the exit signal only if the following conditions are satisfied:
- a) that through this electric equipment the mutual permission between the station

- vozova i susednih stanica (traženje i davanje privole);
- b) da je davanje privole za neku vožnju uslovljeno time da je prethodno voz potpuno ušao u susednu stanicu, kao i da su u momentu davanja privole odgovarajući ulazni i izlazni signali u položaju »stoj»;
 - c) da je tehnički onemogućeno da se u slučaju pojave bilo kakvog kvara ili smetnje na uređaju, može pojaviti bilo kakvo ugrožavanje saobraćaja kako na pruzi tako i u stanicama.
20. Za uređenje automatskog pružnog bloka u pružnom signalno-telekomunikacionom kablu mogu se koristiti maksimalno 4 parice.
- 20.a Ponuđač je obavezan da ponudi pružni napojni kabel sa priborom konstrukcije i preseka koje zahteva njegovo ponuđeno tehničko rešenje uređaja automatskog pružnog bloka.
- 21. Pružni napojni kablovi**
- a) Opis:
- Kabel sa bakarnim provodnicima sa izolacijom od plastične mase ispunom od nevulkaničirane gume ili plastične mase, zaštićen metalnom trakom i sa spoljnjim plastičnim zaštitnim pokrovom od plastične mase, za nazivni napon od 1 kV.
- b) Specifični zahtevi:
- Specifični otpor meko odžarenog bakarnog provodnika ne sme biti veći od 17,241 ohma. mm²/km na 20°C.
- Plastična masa za izolaciju mora zadovoljiti sledeće zahteve:
- | | |
|--|-----|
| Prekidna čvrstoća minimalno kg/cm ² | 160 |
| Prekidno izduženje minimum % | 180 |
- Specifični otpor izolacije na 20°C
minimum ohma. cm 1×10^{14}
- Specifični otpor izolacije na 60°C
minimum ohma. cm 1×10^{11}
- Otpornost na minus temperaturama:
- | | |
|--------------|--------|
| Na savijanje | — 15°C |
| Na udar | — 15°C |
- Plastična masa za plašt mora zadovoljiti sledeće zahteve:
- | | |
|--|-----|
| Prekidna čvrstoća minimum kg/cm ² | 160 |
| Prekidno izduženje minimum procenta | 180 |
- Specifični otpor izolacije na 20°C
minimum ohma. cm 1×10^{12}
- Otpornost na minus temperaturama:
- | | |
|--------------|--------|
| Na savijanje | — 15°C |
| Na udar | — 15°C |
- Kao zaštita od glodara kablovi moraju biti zaštićeni metalnom trakom.
 - Naponsko ispitivanje: 4 kV naizmeničnog napona.
 - Dielektrična čvrstoća:
Prethodna ispitivanja: sa 8 KV najzničnog napona za vreme od 5 minuta na 60°C.
- inspectors in neighbouring stations made (requiring and giving the permission);
- b) that giving the permission for any movement is dependant on the fact that the foregoing train has already completely entered the neighbouring station as well as that in the moment of giving the permission the corresponding entry and exit signals are in a »Stop« position.
20. In line signaling and telecommunication cables for automatic block system the maximum of 4 pairs may be used.
- 20a. Tenderer is obliged to offer line feeding cables with accessories which have design and cross sectional area required by the offered technical solution of automatic block section.
- 21. Line feeding cables**
- a) Description:
- A cable with copper conductors, plastic insulation nonvulcanized rubber or p. v. fill, metal band protection p. v. c. outer sheathing, rated voltage 1 kV.
- b) Specific requirements:
- specific resistance of hard drawn copper conductor must not exceed 17.241 ohm mm²/km at 20°C,
 - insulation plastic must fulfill the following requirements: Breaking strength minimum 29/cm²
Breaking length, minimum %
Specific insulation resistance at 20°C
minimum ohms cm 1×10^{14}
Specific insulation resistance at 60°C
minimum ohms cm 1×10^{11}
Resistance at temperatures below 0°:
Bending strength — 15°
Resistance to shock — 15°
 - The sheathing plastic must fulfill the following requirements:
Breaking strength minimum kg/cm² 160
Breaking length minimum % 180
Specific insulation resistance at 20°C minimum ohms cm 1×10^{12}
Resistance at temperatures below 0°:
Bending strength — 15°
Resistance to shock — 15°
 - Cables must be protected from rodent by metal band.
 - Potential testing: 4 kV A. C.
 - Dielectric strength:
Previous testing: with 8 kV of A. C. voltage during 5 minutes at 60°C.

Glavno ispitivanje: Sa 1,2 kV jednosmer-
nog napona za vreme od 10×24 h.

- c) U svemu ostalom kablovi moraju biti ugrađeni shodno VDE 0271/62 ili odgovarajućem nacionalnom standardu proizvođača.
- d) Za ovaj tip napojnog kabla ima se ponuditi i sav potreban kablovski pribor.
- e) Ponudeni tip pružnog napojnog kabla mora biti zaštićen od uticaja opasnih napona struje vuče i korozije.

k. Tehnički uslovi za osiguranje putnih prelaza

- I. Za osiguranje putnih prelaza u nivou dolaze u obzir samo automatski uređaji kod kojih se ispravno funkcionsanje kontroliše iz stalno posednutog službenog mesta.

l. Automatski uređaji mogu biti izvedeni:

- a) samo sa svetlosnim signalima,
- b) sa svetlosnim signalima i polubrancima,
- c) sa svetlosnim signalima i svetlosnim tablicama sa natpisom »DVA VOZA».

Način osiguranja i tip uređaja za osiguranje putnih prelaza naznačeni su u situacionim planovima stanica i pruga.

m. Automatski uređaji sa svetlosnim putnim signalima moraju ispunjavati sledeće osnovne uslove:

- a) svaki putni signal mora biti opremljen sa po dve crvene svetiljke koje naizmenično svetle kada se putnom prelazu približavaju železnička vozila. Svetiljke se naizmenično pale i gase 60 puta u minuti;
- b) ako uređaj ima samo putne svetlosne signale, onda oni moraju biti opremljeni tako zvučnim zvonima koja se postavljaju na stub putnog signala. Zvono mora biti uključeno sve dok putni signali pokazuju zabranjen prelaz preko železničke pruge.
Zvono mora da radi u ritmu od 120 udara u minuti;
- c) Putni signali moraju biti u redovnom položaju ugašeni;
- d) Uredaj uključuje i isključuje voz koji se približava putnom prelazu;
- e) Svetlosni signali se gase najkasnije 5 sekundi posle prolaska železničkih vozila;
- f) ako se između uključne tačke i putnog prelaza nalazi glavni signaal ili stanica onda uređaj mora biti sposoban za automatsko postavljanje od strane voza i za posluživanje iz stanične centralne postavnice.
U slučaju automatskog postavljanja uređaji putnog prelaza nisu u zavisnosti sa signala;

Main testing: with 1.2 kV of D. C. voltage during 10×24 h

- c) in all other respects the cables must be installed in accordance with VDE 0271/62 or the corresponding manufacturer's national standard,
- d) for this type of feeding cable all necessary cable accessories have to be offered,
- e) the offered type of a line feeding cable must be protected from extraneous dangerous currents of the electric traction and corrosion.

IX. Technical conditions for level crossings protection

1. For protection of level crossings only automatic equipment must be taken into account, the proper functioning of which is permanently inspected from an operating post.

2. The equipment for automatic protection can be as follows:

- a) only with light signals,
- b) with light signals and semi-barriers;

c) with light signals and illuminated indicator tables with an inscription »TWO TRAINS«.

The way of protection and the kind of level crossing protection equipment are indicated in the plans of stations and lines.

3. The automatic equipment with road light signals must satisfy the following basic conditions:

- a) each road signal must be fitted with two red lamps which are lighted alternately when a train approaches the road crossing. The lamps are automatically lighted and extinguished 60 times per minute;
- b) If the equipment has only road light signals, they must be equipped with loud sounding warning bells placed on the road signal post. The bell must be connected as long as the road signals indicate the forbidden passage across the line. The bell must work with 120 strokes per minute;
- c) The road light signal in their basic position must be extinguished;
- d) The equipment is activated by an approaching train;
- e) The light signals extinguish at the latest 5 seconds after a train has passed;
- f) if between the activating point and the level crossing a main signal or a station are located, the equipment must be able for an automatic setting by a train, and for operating from the station central control panel. In the case of the automatic activating, the level crossing equipment is not in dependence with signals;

g) otkazivanjem jednog od elemenata od kojih zavisi ispravno funkcionisanje uređaja, nesme da se ugrozi bezbednost saobraćaja na putnom prelazu. Uredaj mora biti izведен tako da se putni signali uključuju u svakom slučaju kada se pojavi ma kakva smetnja. Ovaj zahtev treba rešiti udvostručavanjem onih elemenata koji bi mogli da budu uzročnici smetnje ili nekim drugim tehničkim rešenjima;

- h) kontrolni uređaj u službenom mestu u kome se kontroliše ispravno funkcionisanje uređaja, mora pokazivati tri stanja:
1. ispravno stanje
 2. pojavu smetnje
 3. pojavu kvara

pri čemu se pod smetnjom podrazumeva tehnička neispravnost koja ne ugrožava bezbednost na putnom prelazu (putni signali pokazuju crvenu svetlost), dok se pod kvarom podrazumeva tehnička neispravnost koja ugrožava bezbednost na putnom prelazu zbog toga što putni signali ili polubranici ne zabranjuju prelaz preko železničke pruge kada se približava voz.

4. Polubranici:

- a) Pogonski motori moraju biti opremljeni električnim spojnicama koje pridržavaju polubranike u krajnjim položajima;
- b) Polubranik mora u slučaju prestanka struje da se automatski spusti u položaj „Zabranjen prelaz“. Polubranik mora biti podešen za ručno podizanje pomoću ručice;
- c) pogonski motori moraju biti podešeni tako da spuštanje polubranika traje oko 10 sekundi a podizanje oko 5 sekundi;
- d) Polubranik mora imati zaseban pogonski motor;
- e) Polubranik mora biti vezan sa pogonskim motorom tako da ne dolazi do oštećenja ni polubranika ni motora u slučaju da polubranik prilikom spuštanja nađe na neku prepreku (na primer: ako udari na krov nekog drumskog vozila). Svako oštećenje polubranika mora se pokazati na kontrolnom uređaju kao kvar;
- f) pre spuštanja polubranika mora se čuti predzvonjenje koje traje u zavisnosti od dužine putnog prelaza 15—25 sekundi. Za vreme predzvonjenja putni signali moraju pokazivati crvenu naizmeničnu svetlost;
- g) Na vrhu polubranika mora postojati crvena svetlost koja zasvetli čim se polubranik pomakne iz svog redovnog položaja i mora svetleti sve dok se polubranik ne vrati u taj položaj.

g) the failing of any element on which the correct functioning depends must not affect the safe traffic on the level crossing, the equipment must be such that the road signals are lighted always when any trouble arises, this requirement to be solved by double equipping with those elements which might cause trouble, or by any other technical solutions;

h) the control equipment at the inspection office at which the correct functioning of the equipment is inspected, must indicate three states:

1. correct state
2. failure occurrence
3. defect occurrence,

— by which under failure is considered the technical deficiency which brings into danger the safe road crossing while under defect is considered the technical deficiency which brings in danger the safety on a level crossing because the road signals or the lifting barriers do not forbid the railway line crossing when the train approaches.

4. Semi — barriers:

- a) the operating motors must be equipped with electric devices to hold the barriers in extreme positions;
- b) the semi-barrier must, if the current supply is interrupted, automatically drop into position »Crossing forbidden«. The semi-barrier must be adapted for manual lifting by handle;
- c) the operating motors must be constructed so that the dropping of barrier lasts about 10 seconds and the lifting about 5 seconds;
- d) each semi-barrier must have a separate operating motor;
- e) the semi-barrier must be connected to the operating motor in that way that no damage arises in case the barrier while dropping, comes across an obstacle (for example, if it bumps against the top of a road vehicle). Any damage of the barrier must be indicated on the inspection panel as a defect;
- f) before barrier dropping first the fore-ringing of a warning bell must be heard lasting in dependence on a road crossing length, 15—25 seconds. During the fore-ringing the road signals must indicate a red flashing light;
- g) on the barrier top a red lamp must be located which is lighted as soon as the barrier is moved from its basic position and it must shine long as the barrier has not returned to its basic position;

5. Svetlosne table:

Svetlosna tabla nosi natpis »DVA VOZA« i postavlja se na dvokolosečnim i paralelnim prugama umesto polubranika na putnim prelazima sa neznatnim saobraćajem drumskih motornih vozila. Svetlosna tabla se postavlja neposredno ispod trougle ploče putnog prelaza i mora biti izvedena tako, da se natpis ne vidi kada nije osvetljen. Ovaj natpis se uključuje samo kada se istovremeno na drugom koloseku približava putnom prelazu još jedan voza.

Uključenje ovog natpisa mora biti proprije posebnim akustičkim signalom. Ako stični signal traje sve do nailaska voza na putni prelaz po drugom koloseku.

6. Napajanje putnih prelaza se vrši iz napojnog kabla.

U slučaju bilo kakvog kvara na napojnom uređaju svetlosni putni signali se napajaju iz posebne baterije dimenzionirane za osmočasovno rezervno napajanje.

7. Za uređaje putnih prelaza na otvorenoj pruzi, u pružnom signalno-telekomunikacionom kablu mogu se maksimalno koristiti dve parice.

X. Autostop uređaji

1. Imaju se ponuditi autostop uređaji za zastavljanje voza kod signala u položaju »stoj«, ukoliko mašinovoda nije blagovremeno preuzeo mere za zastavljanje voza.
2. Autostop uređaji treba da obezbede sigurne zastavljanje vozova pri brzinama od 120 km/čas i većim, na odstojanju maksimalno 200 m iza signala sa sigurnosnim pojmom »stoj«.
3. Ponuđeni sistem mora biti takav da omogućava dogradnju uređaja za automatsko kontrolisanje i regulisanje brzine kretanja vozova u zavisnosti od prijemnih informacija sa pruge.
4. Uređaj mora biti podesan za primenu na lokomotivama sa jednosmernom ili naizmeničnom strujom vuče kao i na dizel i parnim lokomotivama.
5. Rad uređaja ne sme da zavisi od vremenskih uslova, uticaja struje vuče, potresa i drugih spoljnih uticaja.
6. Uređaj mora biti tako konstruisan da se može jednostavno ugraditi u lokomotive i na pruzi, pri čemu ne sme prelaziti granice slobodnog profila.
7. Uređaj treba u sebi da sadrži što manje pokretnih delova, zbog čega dolaze u obzir i rešenja sa beskontaktnom tehnikom, ali pri tome moraju biti ostvareni i svi uslovi za signalno sigurno funkcionisanje ovakvog sistema.
8. Za ponuđena tehnička rešenja moraju se dostaviti detaljni tehnički opisi sa osnov-

5. Indicator table

The illuminated indicator table has an inscription »TWO TRAINS« and is placed on double track and parallel lines instead of lifting barriers on level crossings with a slight traffic of road motor vehicles. This illuminated indicator table is placed immediately below the triangle plate of a level crossing and must be made so that the inscription is invisible when not illuminated. This inscription is lighted only when on the other track at the same time one more train approaches the level crossing. The lighting of this inscription must be followed by warning bell ringing. It lasts as long as the other train comes across the level crossing on the other track.

6. The power supplying of level crossings is performed through a feeding cable.

In the case of any defect on the feeding equipment, the light flashing road signals are fed from a separate battery rated for a feeding during eight hours.

X. Automatic stopping equipment

1. The automatic stopping equipment must be provided to stop a train when a signal is in »Stop« position, if the engine driver has not taken the measures to stop the train.
2. The automatic stopping equipment has to provide the sure stopping of a train at speed of 120 km/h, at a maximum distance 200 m behind the signal in »Stop« position.
3. The offered system must be such as to enable the additional installing of the equipment for automatic train speed control in dependence with the information received from the line.
4. The equipment must be convenient for the installation on A.C. or D.C. locomotives, as well as on diesel and steam locomotives.
5. The equipment functioning must not depend on weather conditions, influence of traction current, shakes and other external influences.
6. The equipment must be constructed so that it can be easily installed both on locomotives and on line, but it must not exceed the clearance limits.
7. The equipment must include a minimum of mobile parts, due to which also the solutions with contactless technique will be taken into account, but in this case all the conditions for a reliable functioning of such a system must be realized.
8. For the offered technical solution the detailed technical conditions with basic drafts

- nim nacrtima i šemama sa karakteristikama i uslovima ugradnje i eksploracije.
9. Ponuđač je obavezan da podnese informacije o ugrađenim uređajima ove vrste.
 10. Autostop uređajima opremlje se svi signali automatskog pružnog bloka, ulazni i izlazni signalni glavnih prolaznih koloseka u stanicama.
 11. Ima se ponuditi punktualni sistem autostop uređaja a može se alternativno ponuditi i kantinalni.
 12. Imaju se ponuditi i lokomotivski autostop uređaji sa naznačenjem jedinične cene (bez montaže) s tim, što će se za te uređaje zaključiti poseban ugovor za opremu oko 300 lokomotiva.

B. TELEKOMUNIKACIJE

Na jednokolosečnim i dvokolosečnim prugama sa automotskim pružnim blokom i bez njega, imaju se ostvariti sledeće telegrafsko-telefonske veze za obezbeđenje i regulisanje železničkog saobraćaja (na pruzi i u stanicama):

- I. Železničke automatske telefonsko-telegrafiske i pružne veze
- II. Višokofrekventni uređaji za rad po koaksijalnim tubama
- III. Interfonetski uređaji
- IV. Satni uređaji
- V. Uređaji za telegrafiju naizmeničnim strujama
- VI. Uređaji za ozvučavanje
- VII. Registrofonski uređaji
- VIII. Pruzni telegrafiski uređaji
- IX. Teleprinterske mašine sa priborom.

I. Železnička automatska TT mreža i pružne veze

1. Osnovni uslovi

Postojeća ŽAT mreža je izgrađena sa sistemom »BASA 41«, zasnovana na propisima nemačkih saveznih železnica. Ova se mreža sastoji iz dve ravni i to Zajednice Jugoslovenskih železnica (JŽ) i Zajednice železničkih preduzeća (ZŽP).

Zbog jedinstvenog tehnološkog procesa JŽ, na prugama koje se modernizuju, ŽAT mreža treba da se proširi. Ovo proširenje omogućava ugradnja pružnog kombinovanog signalno-telekomunikacionog kabla, visokofrekventnih telefonskih i ostalih sistema na pruzi.

Predviđena proširenja i ugradnju novih ŽAT centrala, treba izvesti tako, da omogućavaju rad sa postojećim sistemom na mreži JŽ, a da se pri tome ne moraju vršiti veće rekonstrukcije postojećeg sistema.

Minimalni kapaciteti ŽAT mreže koje treba ostvariti su:

Svi spojni putevi između centrala moraju se koristiti u oba smera;

and schemes with specifications and conditions for installation and operation must be submitted.

9. The Tenderer is obliged to submit the information on installed equipment of the offered kind.
10. All signals for the automatic block system, entry and exit signals of main through lines in stations will be equipped with automatic stopping equipment.
11. The intermittent train control or alternatively the continuous one is to be offered
12. Also the locomotive automatic stopping equipment shall be offered, stating the unit prices (without installation) because for these equipment special contract shall be concluded to equip about 300 locomotives

B. TELECOMMUNICATIONS

The following telephone and telegraph communications shall be executed on the single — and double-track lines with the automatic block system and without it in order to achieve a proper traffic control (on the line and in stations):

- I. Railway automatic telephone — telegraph and line communications
- II. Carrier frequency equipment for operation by coaxial tubes
- III. Talk-back equipment
- IV. Electric clock equipment
- V. Voice frequency carrier telegraph equipment
- VI. Loudspeaker equipment
- VII. Telephone recorder equipment
- VIII. Line-side telegraph equipment
- IX. Teleprinter equipment

I. Railway automatic telephone network

1. Basic conditions

The present railway automatic network (hereafter referred to as RAT) has been constructed on the basis of »BASA 41« system according to German railways (DB) rules. This network consists of two levels and that of the Community of Yugoslav Railways (JŽ) and Community of Railway Enterprises (ZŽP).

Owing to the unique technological process of work on the Yugoslav Railways on those lines which are comprised within the Modernization program, the RAT network has to be extended. This extension is made possible by the installation of the combined line-side signaling and telecommunication cables, carrying frequency telephone and other systems along the lines.

The programmed extensions and installation of new RAT exchanges, shall be executed so as to enable the operation with the existing system over the Yugoslav Railways network requiring no larger reconstructions of the existing system.

U dolaznom smeru iz mreže, ŽAT centrale treba da su tako dimenzionisane da se omogući puno (100%) korišćenje spojnih veza; U odlaznom pravcu iz svake centrale na mrežu, dimenzionisati centrale tako da se omogući istovremeno korišćenje najmanje 70% spojnih puteva;

U lokalnom saobraćaju, ostvariti najmanje 20% istovremenih razgovora kroz organe centrale;

Napajanje ŽAT centrala izvesti tako da se obezbedi neprekidan i kvalitetan rad u svim pogonskim uslovima. Potrebno je obezbediti rezervu napajanja tako da se omogući neprekidan rad od 12 časova kod punog optrećenja centrale;

Sve ŽAT centrale treba da imaju uređaj za davanje imena centrale;

U pogledu ostalih uslova važe preporuke CCITT i uslovi za sitsem »BASA 41«.

The minimum capacities of the RAT network which shall be realized are as follows:

all communications between exchanges must be used in both directions;

in the input direction from the network, RAT exchanges should be rated so that the full utilization (100%) of capacities is possible;

in the output direction from any exchange onto the network, the exchange must be rated so that the simultaneous utilization of at least 70% of capacities is possible;

in the local traffic, at least 20% of simultaneous calls must be effected through the exchanges;

the power supply of RAT exchanges must be carried out so that the continuous operation of high quality under all working conditions is provided. The stand-by supply must be provided as to enable the continuous operation during 12 hours under full load conditions. All RAT exchanges must have an arrangement which automatically announces the name of the exchange;

in respect of other conditions the CCITT recommendations and the conditions for »BASA 41« system shall apply.

2. Proširenje velike mreže ZJŽ

Glavne ŽAT centrale mreže ZJŽ, već su izgrađene, izuzev ŽAT Ljubljane za koju će investitor dati posebne podatke u tehničkim podlogama.

U ovim ŽAT centralama treba izvršiti proširenje za broj spojnih puteva koji je dat u tehničkim podlogama.

Proširenje ovih centrala treba izvesti koordinatnim biračima na četvorožičanoj bazi, s tim da se omogući u trouglu Beograd—Zagreb—Sarajevo, automatsko korišćenje obilaznih veza (Beograd—Zagreb preko Sarajeva, Sarajevo—Beograd preko Zagreba, Sarajevo—Zagreb preko Beograda i obratno za sve relacije), bez posebnog biranja.

Prelaz iz velike mreže ZJŽ u mrežu ZZP i obratno, vrši se uvek samo preko glavne centrale ZZP i to na dvo ili četvorožični način.

Ovo proširenje centrala u ravnini velike mreže ZJŽ, treba da se izvede za kapacite date u tehničkim podlogama. Predviđeno proširenje mora da omogući izgradnju krajnjeg kapaciteta bez rekonstrukcija.

2. Extention of the large network of the Community of Yugoslav Railways (YR)

The main RAT exchanges of the network of the Community of YR have already been constructed, except for the RAT of Ljubljana for which the Investor will give separate data in the Technical documentation.

These RAT exchanges have to be extended by a number of exchange lines specified in the Technical documentation.

The extension of these exchanges has to be executed through crossbar switches on a four-wire principle, taking care to enable, in a triangle Beograd—Zagreb—Sarajevo, an automatic utilization of devious communications (Beograd—Zagreb via Sarajevo, Sarajevo—Beograd via Zagreb, Sarajevo—Zagreb via Beograd and reversedly for all relations without extra dialling).

Switching over from the large Yugoslav Railways network onto the Community or RE network and vice versa, is always performed only through the main Community or RE exchange and that through a two — or four-wire system.

This extension of the exchanges in the large YR network level, has to be executed for the capacities specified in the Technical documentation. The planned extension must enable the maximum capacity without reconstruction.

3. ŽAT mreža ZZP

Ova ŽAT mreža već postoji i data je u tehničkim podlogama.

Investitor će u tehničkim podlogama dati broj i kapacitet ŽAT centrala koje treba izgraditi i proširiti postojeće u mrežnom delu.

Nove ŽAT centrale u ovoj ŽAT mreži, treba da su savremene konstrukcije sa koordinat-

3. RAT network of the Community of Railway Enterprises

This RAT network already exists and is specified in the Technical documentation.

The Investor shall specify in the Technical documentation the number and capacity of RAT exchanges which have to be constructed, and those to be extended in a network group of exchanges.

nim briračima, a proširenja postojećih mogu biti i sa sistemom »korak po korak«. Mrežni deo novih i postojećih ŽAT centrala u ovoj mreži, treba izgraditi prema broju i vrsti spojnih puteva, koji su dati u tehničkim podlogama. U ovim podlogama, investitor će dati i zahtev u pogledu dvožičnog ili četvorožičnog mrežnog dela.

4. Satelitne ŽAT centrale u mreži ZZP (SŽAT)

Ove centrale omogućavaju da se svim stanicama na deonici pruge, omogući rad u ŽAT mreži.

Predviđeno je da se u stanicama deonica pruge ugrade male SŽAT centrale koje će biti uključene na najbližu krajnju, čvornu ili glavnu ŽAT centralu. U stanicama gde se ne ugrađuju SŽAT centrale, iste povezati kao lokalne priključke najbliže ŽAT centrali.

U tehničkim podlogama daće se podaci o mestu, kapacitetu SŽAT, vrsti i broju spojnih puteva kao i o lokalnim priključcima susednih stanica.

Veze SŽAT centrala sa odgovarajućom ŽAT centralom ostvariti niskofrekventnim (induktivnim) ili visokofrekventnim spojnim putevima.

Izlaz iz satelitne centrale u ŽAT mrežu uspostavlja se pritiskom na taster telefonskog aparata, čime se postaje lokalni priključak ŽAT centrale na koju je satelitna centra vezana.

Biranje priključaka satelitne centrale iz ŽAT mreže vrši se iz priključne ŽAT centrale sa najviše četiri ili pet cifara, što zavisi od sistema postojećih ŽAT centrala.

SŽAT centrala treba da je sa koordinatnim biračima.

SŽAT centrale mogu i u odlaznom i dolaznom smeru biti automatske, bez posredovanja.

Napajanje SŽAT centrale je iz zajedničke baterije za napajanje telekomunikacionih uređaja u stanicama.

Po pravilu za SŽAT centrale se ne ugrađuje uređaj za javljanje imena centrale, za rad u mreži ŽAT; za lokalni rad je potreban znak centrale, koji može da bude jedinstven za sve SŽAT centrale.

Ove centrale se ugrađuju u prostorije za telekomunikacione uređaje u stanicama a gde ovih nema u relejnim prostorijama za signalne uređaje.

New RAT exchanges in this RAT network shall be of a modern construction with crossbar switches, and the extension of the existing ones may be of a »step by step« type. The network part of new and existing RAT exchanges in this network shall be constructed as per the number and kind of exchange lines, specified in the Technical documentation.

The Technical documentation shall also include the requirement regarding two — and/or four-wire network part.

4. The satellite RAT exchanges in the Community of RE network (SRAT)

These exchanges enable each station on a line section to be included in the RAT network.

It is planned to install in all stations small SRAT exchanges, which will be connected to the nearest terminal, junction or main RAT exchange. The stations in which SRAT exchanges are not installed shall be locally connected to the nearest RAT exchange.

The Technical documentation will specify the data on the location, capacity of SRAT, type and number of exchange lines as well as the data on local extensions of neighbouring stations.

The communications between the SRAT exchanges and the corresponding RAT exchange have to be performed through the voice frequency (inductive) or carrier frequency exchange lines.

The output from the satellite exchange into the RAT network shall be made by pressing the push button on a telephone set, by which it becomes a local extension of that RAT exchange to which the satellite exchange is connected.

Dialling of satellite exchange extensions from the RAT network shall be performed from the telephone set in the RAT exchange with not more than four or five figures, depending on the system of the existing RAT exchanges.

The SRAT exchange shall be with crossbar switches.

Both in the output and input directions the SRAT exchange shall be able to operate automatically, without manual control. The power supply of the SRAT exchange is from a unique battery for feeding the telecommunication equipment in the station.

As a rule, in SRAT exchanges is not installed an arrangement announcing the name of the exchange for operation in the RAT network, but for a local operation an exchange identification signal is necessary, which may be unique for all SRAT exchanges.

These exchanges are mounted in the rooms for telecommunication equipment in stations, and if there is no telecommunication equipment, in the relay rooms for signaling equipment.

5. Proširenje mreže železničkih automatskih telegrafskih centrala (ŽATg)

Na priloženoj šemici mreže železničkih automatskih centrala u ravni Zajednice JŽ prikazane su sve ŽATg centrale i spojne veze ove mreže.

Brojevima uz simbol centrale označeni su kapaciteti lokalnih priključaka centrala za koje treba proširiti kapacitet ovih centrala, a brojevi u zagradama pored ovih označavaju konačne kapacitete za koje treba pripremiti centrale, tj. snabdeti ih stalcima i ožičenjem.

Sve postojeće ŽATg centrale su sistema WT39 (»korak po korak«).

Izvođač može proširenje ostvariti bilo sistemom korak po korak, bilo sistemom sa koordinatnim biračima, s tim da se omogući rad sa postojećim sistemom.

Za ostvarenje punog korišćenja u oba smera spojnih veza između centrala, treba ugraditi potreban broj mrežnih organa (dvosmernih prenosnika, birača, itd.).

Centrala treba da omogući 30% istovremenih veza.

Izvođač može ponuditi i drugo tehnički bolje rešenje za ovu mrežu.

ŽATg centrale mogu biti tako izvedene, da se omogući i skupna veza više korisnika (konferencijske veze).

ŽATg centrale ugraditi u sklop prostorija postojećih automatskih telefonskih centrala. Sistem centale treba da je takav da omogući priključak lokalnih i dalekih pretplatnika 2/4 — žično sa radom pomoću jednostrane i obostrane struje.

Uz svaku centralu isporučiti potrebne merne instrumente i pribor za ispitivanje i održavanje svih uređaja.

Napajanje centrala treba izvesti tako, da se obezbedi pouzdan i neprekidan rad u svim pogonskim uslovima.

Mreža u celini mora biti izvedena u skladu s fišom UIC br. 752 od 1962. godine i u skladu s preporukama CCITT-a za daleke telegrafske veze.

5. Extention of railway automatic telegraph exchanges (RATg)

The attached diagram of the railway automatic exchanges network in the Community of Yugoslav Railways level shows all RATg exchanges and exchange lines on this network.

The figures next to the exchange designation represent the capacities of local exchange lines of the exchanges for which the capacity of these exchanges will be extended, and figures in the brackets denote the final capacities for which the exchanges have to be completed, i. e. equipped with racks and wiring.

All existing RATg exchanges are of WT 39 system (step by step).

The Contractor may execute the extension either by »step by step« system, or by the coordinate selectors, but making possible the operation with the existing system.

In order to enable a maximum exploitation in both directions of lines between the exchanges, a necessary number of network assemblies has to be installed (bothway translators, selectors, etc.).

The exchange must enable 30% of simultaneous calls. The Contractor may offer also some other, in technical respect better solution for this network.

The RATg exchanges may be designed so that a common connection for several users is possible (conference connections).

The RATg exchanges shall be installed in the rooms with the existing automatic telephone exchanges.

The exchange system shall enable the connection of local and remote users by 2/4 wires operating with direct current and current in both directions.

Besides the exchange, also all necessary measuring instruments shall be supplied and a testing and maintenance equipment for all installations.

The power supply of exchanges must be reliable and continuous under all operating conditions.

The network as a whole must be executed in accordance with UIC leaflet No 752 of 1962 and with CCITT recommendations for long distance telegraph connections.

6. Selektivni dispečerski uređaji za pruge na kojima se predviđa telekomanda

Selektivni telefonski sistemi služe za sporazumevanje dispečera saobraćaja sa voznim, saobraćajnim i ostalim osobljem na svim stanicama, izlaznim signalima, ulaznim signalima, predsignalima i prostornim signalima.

Sistem mora omogućiti sledeće:

a) selektivno pozivanje (automatsko) svakog priključka na pruzi odnosno stanicu i to u smeru dispečer-pruga i obratno sa pruge do dispečera bez mogućnosti međusobnog pozivanja između mesta na pruzi.

6. Selective calling dispatching equipment for the lines on which the centralized traffic control shall be provided

The selective telephone systems are used for communication between traffic dispatchers and a train, transport and other staff at all stations, exit signals, entry signals, warning signals and automatic plock signals.

a) selective calls (automatic) of each user without possibility of direct dialling along the line i.e. station and that in dispatcher — line direction and vice versa from the line to the dispatcher between places along the line.

- b) kod pozivanja sa pruge prema dispečeru mora postojati kod dispečera mogućnost identifikacije mesta odakle je upućen poziv, a kod pozivanja iz pravca dispečer-pruga, mora kod dispečera postojati optička kontrola pružnog odnosno staničnog priključka, kada je ostvarena veza.
- c) investitor će u tehničkim podlogama dati podatke o broju priključaka.
- d) dispečer treba da ima mogućnost razrešenja svake uspostavljene veze i blokiranja svakog priključka s tim da ceo sistem, izuzev tog priključka i dalje može normalno da radi.
- e) uređaji sistema moraju biti tako konstruisani i izvedeni da je lako moguće održavanje i zamena neispravnih elemenata. Za elemente od čije funkcije zavisi rad celog sistema obavezno predviđeti rezervne elemente sposobne da preuzmu funkciju neispravnih elemenata bez zastoja u radu sistema.
- f) sistem treba da omogući da se po potrebi, prostom manipulacijom ostvaruju veze od dispečera do svih stanica i obratno, bez mogućnosti veze dispečera do signala. Pored toga u ovom slučaju, sistem treba da omogući i pozivanje sa pruge samo do stanice bez mogućnosti veze do dispečera.
- g) za rad ove veze predviđena je jedna niskofrekventna četvorka prečnika vodova 1,2 mm i jedna niskofrekventna četvorka prečnika vodova 0,9 mm.
Ovaj broj parica treba smatrati maksimalnim i treba težiti u tehničkom rešenju smanjenju potrebnog broja parica koje se ne sme odraziti na kvalitet i sigurnost veze.
Poželjno je da se kod pružnog signala upotrebni za selektivnu dispečersku telefoniju i duktorski telefon.
U slučaju da je objekat APB udaljen manje od 50 m od pružnih signala, može se telefon smestiti u taj objekat APB. U suprotnom slučaju, potrebno je na rastojanju 20—30 m ispred signala namestiti poseban telefonski orman. Sklopovi za selektivni priključak treba da su smešteni u objektima APB. Poziv treba da bude akustičan, pomoću sirene. Priključci na pruzi moraju da budu vezani za susednu stanicu a kod telekomandovanih pruga dati mogućnost prespajanja do dispečera. Selektivni telefonski priključci kod ulaznih, izlaznih signala i na telekomunikacionim pultu u stanci moraju da imaju sklopove smeštene u tt prostoriji (ili u releznoj prostoriji signalnih postrojenja u stanci).
- b) When calling a dispatcher from the line, the dispatcher must have an indication from which place the call has been forwarded and the dispatcher, when calling some station, must have a light indication of the line, i.e. station connection, after the communication has been established.
- c) The Investor shall give in the Technical documentation the data on the number of users.
- d) The dispatcher must have a possibility of disconnecting each established communication and eliminating each connection, provided that the whole system works normally except for that connection.
- e) The system arrangement must be so constructed and executed that the maintenance and replacement of damaged parts is easily possible. For those components on the operation of which the functioning of the whole system depends, the spare parts are to be provided to take over the functions of the damaged ones, not causing interruption in the operation of the system.
- f) The system must enable by simple handling, the communications between dispatchers and all stations and v.v. but without possibility to establish the communication from dispatcher to a signal. Besides, in this case, the system must enable the calls from the line only to the station without possibility of communication to the dispatcher.
- g) For the operation of this system an audio frequency quad with conductor dia. 1.2. mm and A. F. quad with dia 0.9 mm conductors shall be provided. This number of pairs shall be considered as maximum, and in technical solution the decreased number of required pairs will be preferable, but the care must be taken that this decrease does not affect the quality and reliability of the communication.
A L.B. telephone for the selective patching telephony is desireable to be used.
If an automatic block case is less than 50 m far from line signals, the telephone may be placed in the above case. If this is not the case, the separate telephone case has to be placed 20—30 m in advance of the signal.
The selective connection assemblies have to be placed in the automatic block cases. The call must be audible by hooter. The telephone sets along the line must be connected to a neighbouring station, and for CTC lines the possibility of switching over to the dispatcher must be provided.
The selective telephone sets at entry and exit signals and on the operator's desk

Kod ulaznih signala za ovu vezu poželjno je koristiti induktorski telefon. Kod izlaznih signala treba namestiti telefonske ormane sa CB telefonima.

U slučaju da na pruzi nema telekomande svi ovi priključci se završavaju na telekomunikacionom pultu u stanici a u slučaju telekomande mora se dati mogućnost prekopčavanja na dispečera telekomande.

U slučaju nezaposedenja pojedinih stanica za izvesno vreme, treba dati mogućnost da se ovi priključci vežu na susednu stanicu. Svi uređaji ove telefonije napajaju se u stanicama iz zajedničke baterije koja napaja sve telekomunikacione uređaje stanice. Otpravnik vozova u stanici mora da ima mogućnost pozivanja i identifikacije priključaka na pruzi i stanici.

in the station must have the component units placed in a telecommunication or relay room in the station.

At entry signals, in this communication system the LB telephone should be used. At exit signals the telephone cases with CB telephone sets shall be placed.

In case there is no CTC on the line, all these lines shall terminate on the station operator's desk, and with CTC the switchings over to the CTC dispatcher must be enabled.

In for some time a station becomes auxiliary, the possibility of connecting these lines with the neighbouring station must be provided.

All installations of this telephone system are supplied with power from a common battery, supplying all telecommunication installations in the station.

Station inspector in the station must have the possibility of calling and identification of users on the line and in the station.

7. Centralni dispečerski telefonski uređaj kod telekomande

Kod ovog sistema dispečer mora da ima telekomunikacioni pult na kome moraju biti priklučene ove vrste priključaka:

- a) ŽAT priključci
- b) PTT priključci
- c) induktorski priključci
- d) interfonski priključci
- e) priključci selektivne dispečerske telefonije

Telekomunikacioni pult mora da ima mogućnost prikopčavanja registrofona.

Telekomunikacioni pult mora biti izrađen tako da ima mogućnost prikopčavanja paralelnog pulta.

Relejni sklopovi biće smešteni u stalke u posebnoj prostoriji.

Centralni dispečerski uređaj treba da ima pored mikrotelefonske kombinacije još i zvučnik i mikrofon koji se mogu naizmenično ukopčavati.

8. Dispečerski uređaj za upravljanje saobraćajem na prugama na kojima se ne predviđa uvođenje telekomande.

Na prugama bez telekomadne, gde se saobraćaj reguliše putem dispečera i otpravnika vozova, u stanicama treba ugraditi uređaje koji omogućavaju selektivno izbiranje od dispečera do stanica, bez identifikacije.

Kod dispečera mora da ima pult sa dugmadi za pozivanje stanica.

Dispečer mora da ima mogućnost pozivanja stanica: pojedinačno, u proizvoljno sastavljenim grupama ili svih stanica odjednom. Pult mora da ima pored mikrotelefonske kombinacije još i zvučnik i mikrofon, koji se mogu naizmenično ukopčavati. U slučaju da nije ukopčan zvučnik, uređaj mora da ima mogućnost prijema poziva od stanica akustično ili optički.

7. Central dispatching telephone CTC equipment

With this system the dispatcher must have a telecommunication desk on which the following kinds of terminals must be provided:

- a) RAT terminals
- b) POTT terminals
- c) LB terminals
- d) talk back terminals
- e) selective dispatching telecommunication terminals.

The possibility of connecting the telephone recorder to the desk must be provided.

The telecommunication desk must be constructed so that connecting of the parallel desk is possible.

The relay equipment shall be mounted on racks in a separate room.

Central dispatching equipment must include beside the micro-telephone a loud-speaker and a microphone which can be alternately connected.

8. Dispatching equipment for traffic control on the lines on which the CTC shall not be provided.

On the lines without CTC, where the traffic is controlled by dispatchers and station inspectors in stations, the equipment enabling a selective calling from dispatcher to stations, without identification shall be provided.

A dispatcher must have a desk with push buttons for calling the stations. The dispatcher must have a possibility of calling the stations: individually, in groups, or all stations at the same time.

Beside a micro-telephone on the desk there must be also a loudspeaker and a microphone, which can be switched on alternately. In case the loudspeaker is not switched on, the equipment must be able to receive a call from stations, either audibly or visually.

U stanici za ovaj sistem treba ugraditi reljene sklopove u stalke telekomunikacionog pulta.

Napajanje mora da je iz zajedničke baterije koja napaja sve telekomunikacione uređaje stanice. Priključak za selektivnu telefoniju u stanici se uvodi u telekomunikacioni pult. Pozivanje dispečera iz stanice se vrši podizanjem slušalice i uključivanjem u vod.

Za ovu vezu predviđena je jedna pupinizovana parica. Pozivanje između stanica nije dozvoljeno.

Dispečer treba da ima mogućnost razrešenja svake uspostavljene veze i blokiraju svakog priključka s tim da ceo sistem izuzev tog priključka i dalje može normalno da radi.

9. Telefonski signalno zvonovni vod

Ovaj vod povezuje dve susedne stanice međusobno.

Na vod su priključena sledeća službena mesta:

stanice,
telefonski ormani kod ulaznih i prostornih signala,
čuvari putoprelaza,
stajališta i
ostala službena mesta.

U stanici je vod uveden na telekomunikacioni pult kao induktorski priključak.

Za davanje polaznih signala ugraditi uređaj za automatsko davanje ovih signala u dva pravca a prema zahtevu i za više pravaca.

Za prijem signala služi telefonsko zvono.

Pozivna struja mora da je 25 Hz.

Uredaj mora da predaje polazni signal od početka ka kraju pruge i to: jedan dug signal u trajanju oko 3 sekunde, i od kraja ka početku pruge i to: dva duga signala u trajanju svaki po 3 sekunde sa razmakom između njih od oko 1 sekunde.

U zaposednutim objektima na pruzi i u stanicama na vod je stalno ukopčano telefonsko zvono.

In stations the relay units should be mounted on the telecommunication desk rack. The power supply must be from a unique battery supplying all station telecommunications. The terminal for a station selective telephony shall be connected to telecommunication desk.

The dispatcher is called from the station by lifting the microtelephone and connecting to the line. For this connection a pupinized pair shall be provided.

Calls between stations are not permitted. The dispatcher must have a possibility of disconnecting each established communication and eliminating each connection, provided that the whole system except this connection works normally.

9. Telephone train announcing signal line

This line interconnects two neighbouring stations.

The following operating posts are connected to this line:

stations,
telephone cases at entry and
block signals,
crossing keepers,
halts and
other operating posts.

This line is connected to the telecommunication desk as a LB terminal.

For giving announcing signals a device for automatic signaling shall be provided for two directions, and for more directions, if required.

The signals are received by means of a telephone bell.

The frequency of the telephone calling current shall be 25 Hz.

The device shall transmit the announcing signal from beginning towards the end of the line and that: one long lasting about 3 sec., and from the end towards the beginning of the line, and that: two long lasting 3 sec. each with a break of about 1 sec. between.

In railway buildings along the line with staff and in stations this bell is permanently connected to the line.

10. Međustanični vod

Ovaj vod povezuje dve susedne stanice međusobno.

U stanici je vod priključen na telekomunikacioni pult kao induktorski priključak.

11. Poslovni telefonski vod

Vod povezuje rasporedne odnosno reonske stanice.

U svaku stanicu između rasporednih odnosno reonskih stanica vod je priključen na telekomunikacioni pult kao induktorski priključak sa izluzičivačem poziva.

12. Vod za udese

Ovaj vod služi kod vanrednih događaja na pruzi ili stanicama za povezivanje ovih mesta

10. Interstation telecommunication line

This line connects two neighbouring stations. In stations, this is connected to telecommunication desk as an LB terminal.

11. Traffic telephone line

The line connects the control and/or regional stations.

In each station between control and/or regional stations the line is connected to the telecommunication desk as an LB terminal with a call separator.

12. Emergency line

This line is used in emergency — to connect the places on the line and in station with

sa nadležnim organima.
Na vod su ukopčani svi telefonski objekti na pruzi i stanicama sa induktorskim pozivom u jednu najbližu ŽAT centralu, preko prenosnika za vanredne događaje. Pozivanje od strane priključaka po objektima je samo u smeru pruga — ŽAT centrala.

3. Telefonski vodovi za održavanje pružnih uređaja

a) *Vod građevinske službe*

Ovaj vod povezuje nadzornika građevinske deonice sa pružnom deonicom svog reona.

Vod je induktorski.

Na vod su ukopčani:

- sva službena mesta građevinske službe ove deonice;
- sve stanice građevinske deonice, kao induktorski priključak na telekomunikacioni pult sa izlučivačem poziva,
- svi telefonski objekti na pruzi, preko telefonskog preklopnika na induktorski telefon.

b) *Vod signalne službe*

Ovaj vod povezuje nadzorništvo signala sa pružnom deonicom svog reona.

Vod je induktorski.

Na vod su ukopčani:

- sve prostorije za smeštanje relajnih signalnih uređaja u stanicama, sa induktorskim telefonom (LB),
- blokovni ormari za automatski pružni blok (APB), preko utikača,
- uređaji za osiguranje putnih prelaza, preko utikača,
- ulazni signali, preko preklopnika, na induktorski telefon.

c) *Vod za održavanje kontaktne mreže*

Vod povezuje:

- kod vuče sa jednosmernim sistemom: susedne elektrovučne podstанице sa svim telefonskim mestima na pruzi. Vod je induktorski. Vod u ENP je ukopčan na mali dirigentski telefon kao induktorski priključak.

U stanicama je uveden u telekomunikacioni pult sa izlučivačem poziva. Na pruzi su ukopčani na vod, svi telefonski objekti preko preklopnika na induktorski telefon.

Za ukopčavanje u vod na pruzi ima telefonski preklopnik sa posebnim ključem.

- kod sistema sa monofaznom vućem: Selektivni dispečerski uređaj za elektrovučuće povezuje dispečera elektrovučuće sa svim železničkim stanicama, elektrovučnim podstanicama i postajama za sekcioniranje, kao i dispečera sa prugom preko telefona montiranih duž pruge u telefonskim objektima. Telefon se uključuje preklopnikom koji je osiguran posebnim ključem.

the corresponding services. This line is connected with all telephone cases along the line and in stations with a LB call on the nearest RAT exchange, through an emergency translator.

The calling shall be possible only from different posts towards RAT exchange.

13. Telephone lines for maintenance of line facilities,

a) Construction maintenance service line
This line connects construction section supervisor with his line section.

The line is connected to LB telephones.

The following are connected to the line:

- all operating posts of the construction service of this line section;
- all stations of the construction section, as LB terminals of the telecommunication desk, with a call separator.
- LB telephones of all telephone cases on the line through a telephone switch.

b) Signal maintenance service line

This line connects signal supervision with line section of his region.

The line is connected to LB telephone.

It is connected with:

- all rooms with relay signaling equipment in stations, with LB telephone;
- block cases for automatic block system (ABS), through plugs;
- level crossing protection equipment, through plugs;
- entry signals, through a switch.

c) Telephone line for overhead contact system maintenance

The line connects:

- D. C. traction:
neighbouring electric traction substations with all telephone cases on the line. The line is connected to L. B. telephones. In substations line is connected to a small control telephone.

In stations it is connected to a telecommunication desk with a call separator. On the railway line all telephone installations shall be connected to the telephone line through a switch. For connecting to the telephone line on the railway line there is a telephone switch with a special key.

- 50 Hz single phase traction:

Selective calling dispatching equipment for the electric traction connects an electric traction dispatcher with all railway stations, electric traction substations and sectioning posts as well as the dispatcher with the railway line by telephone cases.

The telephone is connected by a switch secured by a special key.

Selektivno biranje svih železničkih stanica, EVP i PS i to samo u smeru od dispečera prema pruzi.
U obratnom smeru, pozivanje dispečera se vrši samo podizanjem mikro-telefonske kombinacije.
Dispečerski uređaji u stanicama, EVP i PS, kao i centralni dispečerski uređaj treba da budu u svemu kao i uređaji pod tač. 8.

14. Telefonski objekti u stanicama i na pruzi

a) *Telefonski ormani na pruzi*

Za povezivanje saobraćajnog i osoblja za održavanje, treba na određenim mestima koja su prikazana u tehničkim podlogama ugraditi ormane za smeštaj telefonskih aparata i uređaja.
Ovi ormani u zavisnosti od rasporeda objekata datih u tehničkim podlogama investitora, mogu se ponuditi u različitim izvedbama, kao:

- orman automatskog pružnog bloka,
- tipska kućica (betonska, plastična, aluminijska i t. sl.) u kojoj su smešteni i uređaji automatskog pružnog bloka,
- poseban telefonski orman.

Uvedeni kablovi treba da su zaštićeni.
Unutrašnji prostor treba da je zaštićen od mogućnosti kondenzovanja vlage.
Kabloska glava, translatori, osigurači i dr. telefonski pribor osim samog telefonskog aparata, preklopnika i utikača treba da su smešteni tako da su nepristupačni za korisnike telefona.

Vrata ponuđenog objekta treba da su dobro zavojena i moraju biti opremljena sa bravom jedinstvenog tipa, s tim da se ključ ne može izvaditi iz brave ako vrata nisu pouzdano zavravljena.
Izvesti unutrašnju resvetu prostora za smeštaj telefona, na takav način, da se ista uključuje otvaranjem vrata.
U ormanu treba da je induktorski telefon tropske izvedbe.

Translator, utikači i telefonski preklopniči treba da budu zaštićeni od atmosferskih i ostalih električnih uticaja. Predviđeni način priključaka treba da bude tako izведен da opterećenje telefonskog voda nastaje samo u slučaju kada je telefon preklopnikom ili utikačem spojen sa vodom.

b) Na prugama sa automatskim pružnim blokom, kod izlaznih signala ili u reonu skretničkih grupa kao i kod prostornih signala gde se u podlogama investitora zahteva poseban telefonski orman, potrebno je predvideti ugradnju posebnih malih telefonskih ormana.

Telefonski aparat koji se ugrađuje u ovaj orman mora biti tropske izvedbe.
Konstrukcija i zaštita treba da bude ista kao kod velikih ormana.

c) *Telekomunikacioni pult*

Za koncentraciju svih telekomunikacionih

Selective calling of all railway stations, ETS and TSP and that only in dispatcher-line direction.

In the opposite direction, the dispatcher is called on only by lifting the microphone.

Dispatching equipment in stations, ETS and TSP, and central dispatching equipment should in all respects correspond to the equipment under 8.

14. Telephone posts in stations and along the line

a) Telephone cases along the line

For connecting the traffic and maintenance personnel, in the places specified in Technical documentation the cases for telephone sets and equipment shall be installed.
Depending on the layout of arrangements given in the Technical documentation by the Investor, the mounting of telephone sets and equipment, may be offered in different ways, and that:

- automatic block section case,
- typical box (concrete, plastic, aluminium and al.) in which also an automatic block section equipment is placed,

— separate telephone case.

The cables installed have to be screened. The inner space must be protected from moisture condensation.

Cable distribution haed, translators, fuses and other telephone accessories except for the telephone set, switch and plug have to be installed so as not to be accessible to the telephone users.

The door of the offered structure shall be tight, and have a unique type lock, provided that the key cannot be removed unless the door is shut.

The internal lighting shall be such that it is switched on automatically as soon as the door is opened. The installed LB telephone shall be of tropic type. Translators, plugs and telephone switches shall be protected from weather and electrical influences.

The terminals must be such that the telephone line loading arises only when the telephone is connected to the line by a switch or plug.

b) On the lines with ABS (automatic block section), at exit signals, or in the area of point groups, as well as at block signals where the Technical documentation requires a separate telephone case, the installation of special small telephone cases shall be provided.

The telephone set mounted in this case shall be of tropic construction.
Construction and protection have to be the same as with the large cases.

c) Telecommunication desk
For the concentration of all telecommunicatio-

nih veza u železničkim stanicama treba ugraditi telekomunikacioni pult.

Pult treba da bude izведен za postavljanje na sto (po zahtevu investitora može da bude i panelne izvedbe).

Relejni stalci treba da budu smešteni u prostorije za telekomunikacione uređaje a gde ovih nema u prostorije za signalne uređaje.

Telekomunikacioni pult treba da je podešen tako da može da primi sledeće vrste priključaka:

1. za automatsku telefoniju (ŽAT i PTT)
2. CB priključke
3. induktorske, sa uređajem za automat-sko davanje polaznih signala,
4. induktorske, sa i bez izlučivanja poziva,
5. dispečerske, za saobraćajne dispeče-re bez telekomande i dispečere elek-trovruće,
6. dispečerske priključke za telefone kod pružnih, ulaznih i izlaznih signala, sa uređajem za biranje i identifikaciju i uređajem za prekopčavanje za susedne stanice ili ka dispečeru telekomande,
7. interfonske priključke,
8. za uređaje za ozvučavanje, radi obave-štavanja putnika ili službenih mesta.

Telekomunikacioni pult treba da bude izrađen tako da omogućava postavljanje paralelnog pulta.

Pozivi treba da su optički i akustički, sa mogućnošću prigušenja akustičnog poziva.

Telekomunikacioni pult treba da je tako podešen da može da se priključi dupleks pojačavač i registrofon.

Napajanje treba da bude iz centralne baterije.

Broj i vrstu priključaka daće investitor u tehničkim podlogama.

Telekomunikacioni pult treba da ima sopstveni uređaj za pozivanje.

U slučaju da postoji ŽAT centrala u stanci, može se koristiti njen uređaj za pozivanje. Treba da postoji mogućnost jernovremenog rada sa više istovrsnih priključaka.

Telekomunikacioni pult treba da bude izveden sa tasterima.

d) Pomoći telefon za otpravnika vozova u stanci

Ovo je induktorski telefon sa potrebnim telefonskim preklopnikom, smešten na stolu ili zidu, za ukopčavanje na važnije saobraćajne i induktorske vodove za održavanje pružnih postojanja.

e) Napojni uređaji

Napajanje svih telekomunikacionih uređaja u stanci izvesti na takav način da

tions the telecommunication desk shall be mounted in railway stations. Alternatively upon the Investor's request the desk may be replaced by a panel. Relay racks have to be placed in rooms for telecommunication equipment, and if there is no telecommunication equipment, in the room with signalling equipment.

The telecommunication desk shall be of such construction as to make possible to install the following kinds of terminals:

1. for automatic telephony (RAT and POTT)
2. CB terminals;
3. LB terminals with a device for automatic announcing signaling;
4. LB with and without call separator;
5. dispatching for traffic dispatchers without CTC and dispatchers of the electric traction;
6. dispatching terminals for telephones at block, entry and exit signals with equipment for selection and identification and the equipment for switching over to neighbouring stations or to CTC dispatcher;
7. talk-back terminals;
8. for loudspeaker equipment for giving the information to passengers or operating control points.

The construction of a telecommunication desk must be such that the installation of a parallel desk is possible.

The calls must be both visual and audible, with a possibility of eliminating the audible call.

The telecommunication desk shall be of such construction that it is possible to connect to it a duplex amplifier and telephone recorder.

The power supply to be from a central battery.

The number and kind of terminals shall be specified by the Investor in the Technical documentation.

The telecommunication desk must contain the own calling unit.

If there is a RAT exchange in a station, the calling unit of this may be used instead.

A possibility of simultaneous operation with several terminals of the same kind must be provided.

The telecommunication desk must be of a push button type.

d) Auxiliary telephone for station inspector
This telephone is of LB type, with a necessary telephone switch. It is mounted on a desk or on a wall. It can be connected to principal traffic and LB lines for maintenance of line structures.

e) Power supply

The power supply of all telecommunication equipments in stations must be continuous, reliable and of high quality.

se obezbedi neprekidno, pouzdano i kvalitetno napajanje.
Izvor napajanja mora da bude tako automatizovan da nije potrebno nikakvo posluživanje.

- f) *Smeštaj tt uređaja u stanicu*
Ponuđač treba da dà dimenzije opreme i predloži potrebne minimalne dimenzije prostorija i vrstu opreme za smeštaj svih tt uređaja u stanicu.
Pored ovoga, treba ponuditi sve potrebne elemente za smeštaj uređaja, kablova i razdelnika sa potrebnim priborom.
- g) *Lokalna kablovska mreža, unutrašnja instalacija i uzemljenje*
Za sve uređaje koji su predviđeni u tehničkim podlogama i ovim uslovima, treba dati potrebnu kablovsku mrežu, unutrašnju instalaciju, potrebna uzemljenja sa osiguranjem i priborom, sa ugradnjom.
- h) *Zaštita osoblja i uređaja od električnih smetnji, opasnosti i uticaja (električne vuče, energetskih postrojenja i atmosferskog elektriciteta)* treba da se izvede u skladu sa JUS, preporukama i propisima CCITT, UIC i VDE.
- i) *Sva isporučena i ugrađena tt oprema mora u svemu odgovarati JUS-u, propisima Jugoslovenskih železnica, VDE, UIC i CCITT.*
- j) *Svi navedeni propisi važe i prilikom preuzimanja gotovih i ugrađenih uređaja.*

II. Visokofrekventni telefonski uređaji

1. *Visokofrekventni sistemi za rad po koaksijalnim tubama* su namenjeni za prenos telegrafskih, telefonskih, mehanografskih, signalnih i ostalih informacija.
Za rad ovih uređaja koristiće se kombinovani podzemni, železnički, pružni signalno telekomunikacioni kabel sa dve koaksijalne tube Ø 1.2/4,4 mm.
Krajnji kapacitet sistema treba da iznosi 300 telefonskih kanala, širine govornog opsega od 300—3400 Hz.
U tehničkim podlogama dat je plan potrebnih v. f. kablovskih veza za mrežu JŽ, koji se odnosi na pruge koje se modernizuju po ovom programu.
Izvođač treba da na osnovu tih podataka ostvari ove veze na savremeni tehnički način. Pri tome se mora voditi računa da rešenje bude takvo, da se omogući maksimalno korišćenje kabela i sistema uz maksimalnu fleksibilnost po svim deonicama.

The power supply source must be fully automated not requiring any manual operating.

- f) Mounting of telecommunication equipment in station
The Contractor has to give the dimension of the equipment and suggests the minimum necessary dimensions of rooms and kind of installation necessary for mounting all telecommunication equipment. Beside these also all the elements necessary for mounting of the equipment, cables and cable distributors with necessary accessories shall be offered.
- g) Local cable network, internal installation and grounding
For all equipments specified in the Technical documentation and these conditions, a necessary cable network, internal installations, necessary grounding with protection, with accessories shall be offered.
- h) Protection of personnel and equipment from electric disturbances, danger and influences (electric traction, power plants and atmospheric electricity) must be executed in accordance with the JUS (Yugoslav standard) and if these conditions do not provide for this kind of protection the conditions, recommendations and rules of CCITT, UIC and VDE shall apply.
- i) All supplied and installed telecommunication equipment shall correspond to JUS regulations and the Yugoslav Railways' rules, and / or the VDE, UIC and CCITT rules.
- j) All mentioned rules shall also apply on the final acceptance of completed and installed equipment.

II. Carrier frequency telephone equipment

1. Carrier frequency systems for operation through coaxial tubes are designed for transmission of telegraph, telephone, data processing signaling and other information. For operation of this equipment a combined underground, railway, line-side signaling and telecommunication cable with two coaxial tubes Ø 1.2/4.4 mm shall be used. The maximum capacity of the system shall amount to 300 telephone channels, audio frequency range being from 300 up to 3,400 Hz.
The Technical documentation gives the plan of necessary carrier frequency cable communication for the Yugoslav railways' network, regarding the lines included in this Modernization program.
The Contractor shall on the basis of these data execute these communications by up-to-date technical solutions, endeavouring to

Napajanje krajnih uređaja izvesti u sklopu napajanja telekomunikacionih i signalno-sigurnosnih uređaja po pravilu, iz akumulatorske baterije. Napajanje pojačavačkih stanica treba da bude izvedeno na principu dajinskog napajanja korišćenjem koaksijalnih tuba.

Napajanje treba biti izvedeno na takav način da se obezbedi pouzdano i neprekidno funkcionisanje svih uređaja sistema.

Krajnji kanalski uređaji moraju se postaviti sa završnim kanalskim sklopovima za spajanje 2/4 — žično i sa mogućnošću za priključivanje na LB i ŽAT centrale.

Prenos signalnih frekvencija treba da se vrši izvan govornog područja svakog kanala. **Krajnje uređaje** treba ugraditi u ŽAT centrali ili prostorije za signalno sigurnosne uređaje po stanicama.

Pojačavačke uređaje ugraditi u kabelska okna koja treba da budu zaštićena od vlage i temperaturskih promena.

Uređaji moraju biti snabdeveni automatskom regulacijom nivoa.

Uređaji moraju biti snabdeveni mernim i ispitnim poljem sa instrumentima za merenje svih pogonskih struja, napona i nivoa, i govornim mestom za rad po kanalima uređaja. Uz sistem isporučiti i 10 garnitura uređaja za kompletan ispitivanja i merenja sistema.

Pored toga ugraditi i kompletne sisteme za brzu i pouzdanu lokaciju svih kvarova na kabelu i uređajima, sa mogućnošću identifikacije zaposednutih mesta.

Raspored zaposednutih mesta vidi se iz tehničkih podloga.

Celi sistem mora biti u potpunosti obezbeđen od svih uticaja struja električne vuće, atmosferskog elektriciteta i uticaja ostalih električnih postrojenja.

Krajnji i pojačavački uređaji sistema moraju biti potpuno tranzistorizirani.

S obzirom da će ovi sistemi služiti za prenos svih vrsta informacija, sistem mora biti tako izveden da se ovaj prenos omogući kvalitetno i pouzdano.

Sistem mora u svemu da odgovara preporukama CCITT koje se odnose na sisteme za daleke veze.

Visokofrekventni sistemi za rad po simetričnim paricama

Sistem je namenjen za prenos telefonskih, telegrafskih, mehaniografskih, signalnih i otsalih informacija.

effect such a solution which will enable the maximum utilization of the cables and the system, with the maximum flexibility on all line sections.

The power supply of terminal equipment shall be executed within the supply of telecommunication and signaling equipment, as a rule, from the accumulator battery.

The power supply of carrier repeaters shall be based on principle of long distance supply through coaxial tubes.

The power supply must be executed so as to provide a reliable and continuous operation of all equipments in the system.

The terminal channel equipment must be installed with terminal channel units for 2/4-wire connection and with a possibility of connecting to LB and RAT exchanges. The transmission of signaling frequencies has to be performed outside audio frequency range of each channel.

The terminal equipment shall be installed in RAT exchanges or rooms with signaling equipment in stations.

The carrier frequency repeaters shall be installed in cable shafts which must be waterproof and protected from temperature changes.

The equipment must have an automatic level control.

The equipment must include measuring and testing fields with instruments for measuring all operating currents, voltages and levels, and a service telephone set for operating of the channels of the equipment. Also 10 sets of equipment for complete testing and measurements of the system shall be supplied.

Besides, also a complete system for a quick and reliable location of all failures on cables and equipment shall be installed, with a possibility of identification from places with service personnel.

The location of these places can be seen in the Technical documentation.

The complete system must be protected from all influences of the electric traction current, atmospheric electricity and influence of other electrical installations.

The terminal and repeater equipment of the system must be fully transistorized.

Due to the fact that these systems will be used for transmission of all kinds of information, the system must be constructed so as to enable the reliable transmission of high quality.

The system must fulfill all requirements of CCITT regarding the long distance systems.

2. Carrier frequency systems for operation through balanced pairs.

The system shall be used for transmission of telephone, telegraph, electronic computing, signaling and other information.

Za rad ovih uređaja koristiće se kombinovani podzemni železnički pružni, signalno-telekomunikacioni kabel sa simetričnim četvorkama prečnika žila 1,2 mm.

Krajnji kapacitet sistema treba da bude 12 telefonskih kanala sa širinom govornog opsega od 300—3400 Hz.

U tehničkim podlogama dat je plan potrebnih v. f. kablovske veza s ovim sistemom na mreži JŽ, koji se odnosi na pruge obuhvaćene planom modernizacije. Izvođač treba da na osnovu ovih podataka ostvari veze na savremeni tehnički način.

Pri tome se mora voditi računa da rešenje bude takvo da obezbedi kvalitetne i sigurne veze u svim uslovima rada. Sistem treba da bude predviđen za dvočićni rad po jednom kabelu u frekventnom području od 6—108 kHz za oba pravca.

Napajanje krajnjih uređaja izvesti u sklopu sa napajanjem telekomunikacionih i sigurnosnih uređaja, po pravilu iz akumulatorske baterije.

Napajanje pojačavačkih stanica treba da bude izvedeno na principu daljinskog napajanja, korišćenjem vlastite parice u kabelu za ovaj sistem.

Napajanje treba biti tako izvedeno, da se obezbedi pouzdano i neprekidno funkcioniрање svih uređaja sistema.

Krajnji kanalski uređaji moraju se postaviti sa završnim kanalskim sklopovima za spašavanje 2/4 — žično i sa mogućnošću za priključivanje na LB i ŽAT centrale.

Prenos signalnih frekvencija treba da se vrši izvan govornog područja svakog kanala. Uredaji treba da budu snabdeveni mernim i ispitnim poljem sa instrumentima za merenje svih pogonskih struja, napona i nivoa te govornim mestom za rad po kanalima uređaja.

Krajnje uređaje treba ugraditi u prostorije ŽAT centrala.

Pojačavačke uređaje ugraditi u prostorije ŽAT centrala u stanicama ili u relejne prostorije signalno-sigurnosnih uređaja.

Uredaje treba izvesti tako da se garantuje pouzdan rad kod svih mogućih promena gumenja u kabelu.

Ceo sistem mora biti u potpunosti obezbeđen od svih uticaja struja električne vuče, atmosferskog elektriciteta i uticaja električnih postrojenja.

Svi uređaji sistema moraju biti potpuno tranzistorizirani.

Pojačivački uređaji sistema treba da rade sa inverzijom prenosnog pojasa frekvencija. S obzirom da će ovi sistemi služiti za prenos svih vrsta informacija, sistem mora biti tako izведен da se prenosi omoguće kvalitetno i pouzданo.

Sistem mora u svemu odgovarati preporukama CCITT-a koje se odnose na sisteme za daleke veze.

For operation of this equipment combined underground line-side, signaling and telecommunication cable with balanced quads, wire Ø 1.2 mm shall be used.

The maximum system capacity shall be 12 telephone channels with channel band width from 300 up to 3,400 Hz. The Technical documentation gives the diagram of necessary carrier frequency cable communications with this system on the Y. R. network, regarding the lines comprised by the Modernization plan.

The Contractor shall, on the basis of these information, carry out the communications by modern technical solutions.

The solution has to provide the reliable communications of high quality under all operating conditions. The system shall be designed for two-wire operation through one cable, in a frequency range from 6—108 kHz in both directions. The power supply of terminal equipment shall be executed within the supply of telecommunication and signaling equipment, as a rule, from an accumulator battery.

The power supply of repeaters shall be performed on the principle of long distance supply, using the own pairs in a cable. The power supply shall provide the reliable and continuous operation of all equipments in the system.

Carrier frequency terminals shall be equipped with arrangement for two/four wire operation and with a possibility of connecting to LB and RAT exchanges.

The transmission of signaling frequencies has to be performed outside the voice frequency range of each channel.

The equipment must consist the measuring and testing fields with instruments for measuring all operating currents, voltage and level as well as the service telephone sets for operating through the channels of the equipment.

The terminal equipment shall be installed in the RAT exchange rooms. The carrier frequency repeaters shall be placed in signaling relay rooms in stations.

The equipment must be such as to guarantee a reliable operation under all possible changes of attenuation in cables.

The whole system must be completely protected from all influences of the electric traction current, atmospheric electricity and electric installations.

All equipments of the system shall be fully transistorized. The repeater equipment has to operate with an inversion of transmission frequency range.

Owing to the fact that these systems will serve for transmission of all kinds of information, the system must enable a reliable and high quality transmission.

The system must fully satisfy the CCITT recommendations regarding the long distance communication systems.

III. Interfonski uređaji

Ovi uređaji se ugrađuju u većim stanicama za kratke i brojne razgovore u pogledu vođenja saobraćaja i manevre.
Centralni uređaj ugraditi u prostoriju, koju će odrediti investitor.
Napajanje interfonskih uređaja se vrši iz centralnih napojnih uređaja u stanicama.
Rad interfonskih uređaja je simpleksan.
Unutrašnja govorna mesta mogu se izvoditi na samostalni ili telekomunikacioni pult, što određuje investitor.
Za ove veze se mora na pultovima predvideti tranzistorски pojačavač, mikrofon i zvučnik sa potrebnim tasterima na pultu.
Spoljna govorna mesta se postavljaju na određena mesta u reonu stanice, pri čemu treba obezbediti slobodan profil pored koloseka. Poseban zvučnik, mikrofon sa kompenzacijom šuma, tranzistorski pojačavač i taster robusne izvedbe, treba da su smešteni u posebnom kućištu koje je isto tako robusne i jake izvedbe, stabilno postavljeno. Konstrukcija kućišta i uređaja mora da je za spoljnu montažu, a unutrašnji uređaj i mora da su neostupni neovlašćenim licima i zatvoreni posebnom jedinstvenom bravom.
Dodatni zvučnici određene snage za pokrivanje predviđenih površina imaju se ugraditi na posebnom metalnom stubu, za spoljašnju montažu i sa mogućnošću usmeravanja.
Za interfonska spoljna i unutrašnja mesta koristi se lokalna telefonska mreža i instalacije.
Za dodatne zvučnike treba predvideti posebne kablove.
U tehničkim podlogama daće se podaci o povezivanju, broju i vrsti govornih mesta i dodatnih zvučnika.

IV. Satni uređaji

1. Za izvršenje reda vožnje potrebno je jedinstveno tačno vreme u železničkom saobraćaju.
Da se ostvari ovo jedinstveno vreme treba da su svi časovnici po stanicama međusobno električno povezani i opremljeni uređajima za korigovanje rada časovnika.
Ovo povezivanje će se vršiti pružnim i lokalnim kablovima i instalacijama.

2. U svakoj zajednici ŽP treba da se ugradi Centralni satni uređaj.
Centralni satni uređaj treba da ima dva sincrona precizna mehanička časovnika sa uređajem za automatski rad.
Centralni časovnici treba da imaju kompenzacione temperaturne elemente.
Centralni satni uređaj treba da bude tako

III. Talk back equipment

This equipment shall be installed in larger stations for short and numerous calls in connection with traffic control and shunting.

The central equipment shall be installed in a room, determined by the Investor. The power supply of the talk-back equipment shall be from the central power supply in the station.

A simplex operation of talk-back equipment shall be provided.

The internal talk-back sets may be connected either to a separate or to a telecommunication desk, which will be specified by the Investor.

For this system of telecommunications a transistor amplifier and a loudspeaker with all necessary push buttons shall be provided on the telecommunication desk. The external talk-back sets shall be located in specified places within the station area, taking care to provide a clearance beside the track. A separate loudspeaker, microphone with noise suppression, transistor amplifier and a push button of robust construction shall be placed in a casing of robust construction. The casing and equipment must be suitable for external mounting, and the internal equipment must not be accessible to unauthorized persons and shall be secured by a special unique lock.

The waterproof additional loudspeakers of power sufficient to cover determined areas shall be mounted on special metal poles and have a possibility of beaming.

For talk-back external and internal official points the local telephone network and wiring shall be used.

For additional loudspeakers separate cables shall be provided.

The Technical documentation shall give the data on connecting, number and kind of talk-back sets and additional loudspeakers.

IV. Clock installations

1. For proper performance according to time table it is necessary to have a unique correct time in the railway traffic.
For the purpose of keeping a unique time all the clocks in stations have to be electrically interconnected and equipped with an arrangement for correcting the clock operation.
This interconnection shall be carried out by line side and local cables and installations.

2. Each Community of Railway Enterprises must have a Central clock system installed. The Central clock system must have two precise mechanic synchro-clocks equipped with an arrangement for automatic operation.
The Central clock system must contain temperature compensation elements. The

izveden da može pouzdano i neprekidno da radi pod svim pogonskim uslovima.
Centralni satni uredaj treba da ima sklopove za automatsko korigovanje rada matičnih časovnika po prugama i strujna kola za napajanje sekundarnih časovnika.
Tačnost centralnog časovnika mora biti u granicama. ± 6 sekundi na mesec.
Strujna kola moraju da imaju na centralnom mestu kontrolne časovnike, uređaje za dometrivanje, potrebne prekidače i ostale instrumente za kontrolu rada.
Centralni satni uredaj mora davati minutne strujne impulse.

3. Po stanicama treba ugraditi matične električne časovnike ili reljefne uređaje za pogon svih časovnika.
Matični električni časovnik ili reljefni uredaj za pogon svih sekundarnih časovnika u stanicama ili na otvorenoj pruzi, mora biti predviđen za davanje minutnih polarizovanih strujnih impulsata.
Električna energija za davanje strujnih impulsata mora biti obezbedena iz akumulatorske baterije koja napaja telekomunikacione uređaje.
Matični časovnik mora biti opremljen uređajem za prijem i realizaciju korekcionih vremenskih impulsata.
Korekcioni impulsi se primaju iz centralnog satnog uredaja automatski.
Matični časovnik ima biti tačan sa dozvoljenim maksimalnim odstupanjem ± 10 sekundi dnevno.
Matični električni časovnik mora da ima uređaje za podešavanje strujnih kola sekundarnih časovnika.
U slučaju ispadanja napojne mreže, treba matični časovnik da samostalno radi još 6 sati.
Sistem uredaja za korigovanje električnih matičnih časovnika ili reljefnih stalaka po stanicama, treba da bude prilagođen zbog uticaja električne vuće, sistemu vuće na deonicu pruge.
4. Sekundarni električni časovnici moraju biti predviđeni za pogon na polarizovane minutne strujne impulse.
Ovi časovnici moraju biti podešeni za paralelno priključenje na časovnički vod sa mogućnošću menjanja unutrašnjeg otpora i električnog prilagođenja na kompletну mrežu predviđene deonice pruge.
Broj i vrstu napojnih uređaja i mesta ugradnje pomenutih satnih uređaja investitor će dati u tehničkim podlogama.

V. Uredaji za telegrafiju naizmeničnim strujama

Uredaji za telegrafiju naizmeničnim strujama (WT uređaji) koriste se za povezivanje ŽATg centrala i svih korisnika kao i za ostale potrebe na mreži JŽ.

central clock equipment must be of such construction as to be able to give a reliable and continuous operation under all operating conditions.

The central clock system must have devices for automatic correcting of main clocks on the lines and electric circuits for feeding the secondary clocks. The central clock correctness shall not vary more than ± 6 seconds per month.

Each circuit must terminate in a central control equipment by control clocks, as well as setting devices, necessary switches and other instruments for operation control.

The central clock system must transmit the electric impulses every minute.

3. In stations must be installed main electric clocks or relay equipment to drive all the clocks.

The main electric clock or relay equipments for driving all secondary clocks in station or on the open line, must be designed so as to transmit the polarized electric impulses every minute.

The power supply for these electric impulses shall be from the accumulator battery feeding the telecommunication equipment. The main clock shall be equipped with a device for receipt and re-transmission of the correcting time impulses.

The correcting impulses shall be received from a central clock automatically.

The main clock correctness shall not vary more than ± 10 sec. per day.

The main electric clock shall contain devices for setting the circuits of the secondary clocks.

In case of power supply breakage the main clock must continue to operate 6 hours more.

The equipment for correcting the main electric clocks or relay racks in stations has to be adjusted, because of the electric traction influence, to the system of traction on a line section.

4. The secondary electric clocks must be designed for drive by polarized minute current impulses.

These clocks must be adjusted for parallel connection to the clock circuit with a possibility of changing the inner resistance and electric adaptation to the complete network of a given line section.

The Investor shall give in the Technical documentation the number and kind of feeding equipments and the location of the above mentioned clock equipments.

V. Equipment for voice frequency telegraphy

The equipment for voice frequency telegraphy (VF equipment) are used for connecting RATg exchanges with all users as well as for other YR necessities.

The Appendix gives a diagram of necessary

U prilogu dat je grafički prikaz potrebnih telegrafskih veza koje treba ostvariti pomoću WT uređaja.
Za ostvarenje ovih veza treba prvenstveno koristiti telefonske kanale.
WT uređaji moraju zadovoljavati sledeće uslove:
Uredaji moraju raditi sa frekventnom modulacijom. Širina pojasa svakog kanala mora iznositi 120 Hz, s tim da se omogući prenos informacija maksimalnim brzinama telegrafisanja od 50 Bauda.
Uredaji moraju biti snabdeveni mernim i ispitnim poljem s instrumentima za merenja svih pogonskih struja, napona i nivoa, te govornim mestom za rad po kanalima uređaja kao i davačem promena za podešavanje telegrafskih impulsa.
Uredaji moraju biti potpuno tranzistorizirani sa mogućnošću napajanja iz mreže 220 V, 50 Hz i iz akumulatorskih baterija 24—60V.
U svemu ostalom uređaji moraju odgovarati preporukama CCITT-a, odnosno UIC u fiši 752.
Uredaje za telegrafiju naizmeničnim strujama treba ugraditi u prostorije ŽAT centrala, odnosno u prostorije signalno-sigurnosnih uređaja.
Uz svaki uređaj, koji se ne završava na organima ŽATg centrala, treba ugraditi pretplatnički sklop za spajanje dalekih priključaka preko WT uređaja na centralu.
WT-sistemi moraju biti opremljeni sa svim potrebnim sklopovima za priključenje na razne VF sisteme.

VI. Uređaji za ozvučavanje

Uređaji za ozvučavanje služe za obaveštavanje putnika i službenog osoblja o kretanju vozova.
Uređaji treba da ostvare sledeće mogućnosti:
Da se pojedini krugovi zvučnika mogu pojedinačno, grupno i svi zajedno uključivati.
Po pravilu uređaj treba da se sastoji iz takvih jedinica, da se obezbedi laka izmena jedinice koja je u kvaru. Rezervna jedinica mora se nalaziti u uređaju za ozvučavanje.
Uz uređaj treba isporučiti posebno komandni pult stolne izvedbe sa potrebnim elementima za ukopčavanje i iskopčavanje pojedinih krugova, sa kontrolom rada čitavog uređaja i svakog pojedinog kruga zvučnika i sa mikrofonom i telefonom, s tim da se kod korišćenja mikrofona, audio pozivni signal telefona zameni optičkim. Ovaj pult može se koristiti sa telekomunikacionim pultom, ukoliko to investitor zahteva.
Uredaj mora biti tako izведен, da se omogući davanje obaveštenja neometano od okolne buke u prostoriji iz koje se vrše obaveštenja.

telegraph communications which have to be performed by VF equipment.

For carrying through these communications primarily the telephone channels have to be used.

VF telegraph equipment must fulfill the following conditions:

The equipment must operate with frequency modulation. The band width of each channel shall be 120 Hz, provided that the data are transmitted at maximum telegraph speed of 50 Bauds.

The equipment must be fitted with measuring and testing panel with measuring instruments for all operating currents, voltage and level, and a service telephone set for operation on the channels of the equipment, as well as the transmitter of alternations for adjustment of telegraph impulses.

The equipment shall be fully transistorized with the possibility of feeding from the 220 V, 50 Hz network and from 24—60 VDC accumulator battery.

In all other respects the equipment shall satisfy the recommendations of CCITT, and/or UIC in No 752 leaflet.

The equipment for the VF telegraphy has to be installed in the RAT exchange rooms, or in signaling equipment rooms.

At each equipment which does not terminate on the RATg exchange elements, a subscribers' set for connecting the remote users through VF equipment to the exchange shall be installed.

The VF systems must be equipped with all necessary assemblies for connection to various carrier frequency systems.

VI. Loudspeaker equipment

The loudspeaker equipment is used for informing the passengers and operating staff about the traffic movement.

The equipment must meet the following requirements:

The separate loudspeaker circuits can be connected individually, in groups, or altogether.

As a rule, the equipment must consist of such units that a damaged unit can be easily replaced. Spare unit must be comprised within a loudspeaker equipment.

Beside the equipment, also a connecting and disconnecting different circuits with checking of the complete equipment operation and of each particular loudspeaker circuit, with microphone and telephone, shall be supplied provided that, when the microphone is used, the audible calling signal is replaced by an optical one.

This control desk may be used together with a telecommunication desk, upon the Investor's request.

The equipment shall be of such construction as to enable the transmission of information undisturbed by noise in the

S obzirom na mesto ugradnje zvučnike treba isporučiti za spoljašnju montažu s tim, da zvučnici za spoljašnju montažu budu zaštićeni od vlage i štetnih gasova. Uredaj treba izvesti za napajanje iz mreže 220 V, 50 Hz.

VII. Registrofonski uređaji

Registrofonski uređaji služe za neprekidno snimanje razgovora s telefonskih vodova koji se koriste za regulisanje saobraćaja. Registrofonski uređaji moraju ispunjavati sledeće uslove:

Snimanje razgovora mora se vršiti bez prekida, na magnetofonskoj traci. Potrebno je obezbediti da se izmena magnetofonske trake ne mora vršiti u vremenu manjem od 24 sata. Uredaj treba biti izведен tako, da se omogući istovremeno registrovanje 6 razgovora.

Svaki osnovni deo, koji bi svojom nesigurnošću mogao onemogućiti neprekidan rad celokupnog uređaja, uređaj treba da automatski prekopča na rezervni deo, s tim da se snimanje razgovora ne prekida. U tom slučaju treba da postoji odgovarajuća signalizacija kvara.

Svaki prekid snimanja, koji može nastati iz bilo kog razloga, treba da se signalizira optički i akustički kako na samom uređaju tako i na još jednom odvojenom mestu s tim, da postoji mogućnost isključenja samo akustičnog signala.

Brisanje snimljenih magnetofonskih traka ne sme se vršiti na samom registrofonu, nego to treba ostvariti pomoću posebnog uređaja za brisanje magnetofonske trake. Uredaj treba da ostvari sledeće mogućnosti:

da se pri snimanju na svakom kanalu može izvršiti prisluškivanje razgovora; da se može pouzdano naknadno utvrditi da li je uređaj za vreme snimanja ispravno funkcionisao; da se može pouzdano utvrditi da li je na traci naknadno vršeno nedopušteno isecanje ili brisanje postojećeg snimka; treba da postoji mogućnost odvojenog reprodukovanja snimljenih traka na uređaju za reprodukciju a da se time ne ometa snimanje; mogućnost lakog pronalaženja traženog snimka razgovora na jednoj traci; sprečavanje pristupa elementima uređaja od neovlašćenih lica;

Osnovni električni uslovi koje uređaj mora ispuniti su:
širina pojasa frekvencije od 300—3400 Hz treba da bude u skladu s preporukama CCITT-a za telefonske kanale; gušenje preslušavanja između pojedinih kanala treba da bude veće od 40 db;

room from which the information are transmitted.

As for the location of loudspeakers, these are to be provided both for the external and internal installation, taking into account that external loudspeakers must be protected from moisture and detrimental fumes.

The equipment shall be supplied with power from the 220 V, 50 Hz network.

VII. Telephone recorders

Telephone recorders are used for continuous recording of traffic control calls from telephone lines.

The telephone recorders must fulfill the following requirements:

The call recording must be performed continuously, on a tape.

The tape must be long enough to give permanent service during 24 hours.

The equipment must be able to record 6 calls simultaneously.

Each basic component which could by its unreliability make impossible the continuous operation of the complete equipment, shall be automatically switched onto a spare part, without interruption of call recording.

In such case, a corresponding defect indication must be provided.

Any recording interruption, arisen for any reason, must be indicated both visually and audibly both on the equipment and on another separate place, providing the possibility of switching off only the audible signal.

The erasing of recorded tapes shall not be performed on a telephone recorder, but on a special equipment for tape erasing. The equipment must fulfill the following requirements:

listening to calls on each channel during recording;

additional checking of proper functioning of the equipment during recording;

additional checking of unpermitted cutting off or erasing of existing record; the possibility of individual reproduction of recorded tapes on a reproduction equipment, not disturbing the recording;

the possibility of easy finding the required call records on a tape; forbidden access of unauthorized persons to the equipment,

The basic electric conditions which shall be fulfilled by the equipment are:

frequency range 300—3400 Hz shall be in accordance with the CCITT recommendation for telephone channels,

attenuation between individual channels shall be larger than 40 db,

the quality of recorded information shall be such as to insure full understanding and fidelity of information

kvalitet snimljenih informacija treba da bude takav, da se obezbedi potpuna razumljivost i vernošć informacije, pri čemu se mora obezbediti pouzdano raspoznavanje boje glasa pri svim mogućim pogonskim uslovima rada.

Napajanje registrofona električnom energijom treba izvesti u sklopu napajanja telekomunikacionih i signalnih uređaja.

Uz svaki uređaj treba isporučiti magnetofonske trake sa koturovima za desetodnevno neprekidno snimanje, što treba da omogući arhivisanje snimaka od proteklih 10 dana. Podatke o potrebi registrofona daje investitor u tehničkim podlogama.

VIII. Pružni telegrafski uređaj

Pružni telegrafski uređaji služe za primanje i davanje saopštenja ispisanih slovnim znakovima, službenim mestima na pruzi po pravilu, između dve rasporedne stanice.

Sva službena mesta vezati paralelno na jednu kablovsку парицу s prečnikom žila 1,2 mm. Uredaj mora ispunjavati sledeće uslove:

primopredajnik mora sadržavati sledeće: predajnik, prijemnik, prevodilac za otpremanje sa perforirane trake primljene iz teleprinterske mreže, posredničku kutiju sa pojačivačem i zvučnikom, sa mogućnošću priključenja pet posebnih prijemnika za pružnu telegrafiju i jedne skupne veze; prijemnik mora sadržavati: prijemnik sa potrebnim tasterima za manipulaciju i LB telefon sa filterom za prigušenje poziva; radna frekvencija uređaja mora biti ugovornom području frekvencija; uređaji moraju da imaju mogućnost premošćenja gušenja na vodu od najmanje 4 N;

Brzina telegrafisanja treba da bude najmanje 6,1 znakova u sekundi. Uredaj treba biti rađen za priključak na mrežu 220 V, 50 Hz;

Raspored i broj priključaka koje treba postaviti daje svaki investitor u tehničkim podlogama.

U svemu ostalom uređaji moraju udovoljavati uslovima železničke uprave zemlje isporučioца za takve veze za postavljanje duž pruge s monofaznom strujom vuče od 25 kV, 50 Hz.

IX. Teleprinterske mašine sa priborom

Teleprintere treba isporučiti u izvedbi za pisanje na list i za brzinu telegrafisanja od 50 Bauda, a treba ih predvideti u izvedbi »kabinet kućišta«.

providing also a reliable distinction of timbre under all possible operating conditions.

The power supply of telephone recorders has to be executed within the supply of telecommunication and signaling equipment.

With each equipment also the tape reels for continuous 10 days' recording have to be supplied, after which the records used during previous ten days shall be filed.

The data on the necessity of telephone recorder shall be given by the Investor in the Technical documentation.

VIII. Line telegraph Equipment

The line telegraph equipment shall be used for receipt and transmission of information written by letter figures to operating points on line, as a rule, between two regional stations.

All operating posts shall be connected parallelly onto one cable pair, wire dia 1.2 mm.

The equipment shall fulfill the following requirements:

receiver-transmitter must consist of the following elements: receiver, transmitter, translator for transmission from perforated tape received from teleprinter network, intermediate distributing desk with an amplifier and a loudspeaker, with a possibility of connecting five separate receivers for line telegraphy and one joint connection;

the receiver shall be equipped with push buttons for operating and LB telephone with elements for suppression of calls;

operating frequency of the equipment shall be in the voice frequency range; the equipment shall be able to compensate the attenuation on a line of at least 4W.

The telegraphing speed must be at least 6.1 figures/sec.

The equipment shall be of such construction that the connection to 220 V, 50 Hz network is possible.

The arrangement and number of terminals to be installed shall be specified by the Investor in the Technical documentation. In all other respects the equipment shall fulfill the conditions of the Railway administration of the Supplier's country for this kind of communications along the 25 kV, 50 Hz single phase traction lines.

X. Teleprinter machines with accessories

The teleprinters supplied shall be of the type for writing on a paper sheet and for telegraphing speeds od 50 Bauds, and shall be housed in cabinet casing.

Teleprinteri moraju biti izvedeni sa tastaturom prema međunarodnoj abzuci broj 2. Teleprinteri moraju biti izvedeni za priključak na mrežu 220 V, 50 Hz.

Uz svaki teleprinter potrebno je isporučiti sledeći pribor:

priklučnu kutiju za spajanje na ŽATg centrale.

Kutija treba da omogući rad u lokalnu uz istovremenu mogućnost prihvatanja poziva iz centrale.

Mašinski otpremnik za automatsko otpremanje sa perforirano trakom, i prijemni perforator.

U svemu ostalom uređaji treba da ispunjavaju uslove date u preporukama u fisi 752 UIC-a i preporukama CCITT-a.

Podatke o potrebnim količinama daće investitor u tehničkim podlogama.

They shall contain keyboard according to the international alphabet No. 2.

The teleprinters shall have connection to 220 V, 50 Hz network.

The following accessories shall be supplied with each teleprinter:

a connection box for connecting to Automatic telegraph exchanges. The connection box must enable the local operation, with a simultaneous possibility of receiving a call from the exchange, an automatic transmitter for automatic transmission by a perforated tape and receiver perforator.

In all other respects the equipment shall fulfill the conditions of 752 UIC leaflet and CCITT.

The Investor shall give the data on the necessary quantities in the Technical documentation.

C. PRUŽNI SIGNALNO TELEKOMUNIKACIONI KABLOVI

I. Signalno telekomunikacioni kabel od najmanje 23×4 za polaganje duž elektrificiranih železničkih pruga monofaznog sistema 25 kV 50 Hz i jednosmernog sistema 3000 V.

Konstrukcija kabela treba u osnovi da bude:
VF četvorke $3 \times 4 \times 1,2 - 252$ kHz

NF četvorke $8 \times 4 \times 1,2$
NF četvorke $12 \times 4 \times 0,9$

U pogledu pomenute konstrukcije kabla investitor može zahtevati i drugu specifikaciju četvorki s tim da se zadrži kapacitet kabla od najmanje 23×4 .

Ukoliko iz konstruktivnih razloga nije moguće realizovati kabel zahtevanog kapaciteta, ponuđač mora dati prvi naredni veći kapacitet kabla.

Primena ispuna umesto četvorki nije dopuštena.

Provodnik mora da bude od okrugle meko odžarene bakarne žice prečnika 1,2 i 0,9 mm. Izolacija omota od kordela i paprine trake. Obeležavanje žila uzdužnim crtama (ili standardnim kodima).

Použenje izvesti u zvezda četvorke.

Sistem kodiranja žila u četvorki mora biti dostavljen od strane izvođača.

Četvorke moraju biti koncentrično použene u jezgro kabla. Raspored NF i VF četvorki ostavlja se na volju proizvođaču. Između slojeva se mora postaviti najmanje jedna papirna traka a preko zadnjeg sloja se mora postaviti pojedinačna izolacija od najmanje četiri papirne trake.

I. Signaling and telecommunication cable of minimum 23×4 wires for laying along railway lines electrified with 25 kV 50 Hz single-phase system and 3000 VDC system.

Basically, the construction of the cables has to be as follows:

carrier frequency quads $3 \times 4 \times 1,2 - 252$ kHz

audio frequency quads $8 \times 4 \times 1,2$

audio frequency quads $12 \times 4 \times 1,9$

In respect of the above mentioned construction of cable the Investor can require also some other specification of the quads on conditions that a cable capacity of at least 23×4 has to be retained.

If for construction reasons it is not possible to realize a cable with the required capacity, the Tenderer can offer the next larger capacity cable.

The conductor must be made of round, soft annealed, copper wire with a diameter of 1.2 and 0.9 mm.

The insulation of the sheath has to be of cotton yarn and paper band.

The wires have to be marked by longitudinal lines (or standard codes).

The twisting has to be made in star quads. The system of coding the wires in a cable quad has to be submitted by the Contractor. The quads must be concentrically twisted into the cable core.

The distribution of audio-frequency and carrier frequency quads is left to the decision of the Manufacturer.

Between the layers at least one paper band has to be placed, and over the last layer have to be placed belt papers of at least four paper bands.

Preko jezgra kabla mora biti postavljen omotač od aluminijuma minimalne debljine 2 mm.

Izvođač će u zavisnosti od sistema vuče dati potrebnu konstrukciju omotača kabela radi mehaničko-antikorodivne zaštite.

Kabl mora biti armiran najmanje dvema čeličnim trakama minimane debljine 0,8 mm, prethodno premazanim kompaund masama.

Čelične trake treba da budu obavijene sa minimalnim zazorom od 33 1/3% od širine čelične trake.

Vrsta i konstrukcija unutrašnjeg i spoljnog zaštitnog omotača ostavlja se na volju izvođaču, s tim da armatura zadovolji sve uslove dobre zaštite.

Otpor petlje provodnika \varnothing 1,2 i 0,9 mm ne sme biti veći od 31,2 odnosno 55,2 ohm/km. Otpor izolacije ne sme biti manji od 10 G-ohm \times km na 20°C.

Dielektrična čvrstoća: Kabel mora da izdrži bez proboga za vreme od jednog minuta naizmenični napon efektivne vrednosti najmanje 2000 V, 50 Hz priključen između aluminijumskog omotača i svih ostalih provodnika spojenih zajedno.

Kabel mora da izdrži bez proboga za vreme od jednog minuta naizmenični napon efektivne vrednosti 1000 V, 50 Hz priključen između žila a i b svake parice.

Redukcioni faktor kabela ne sme biti veći od 0,03 pri indukovanim naponima od 60 — 430 V/km, s tim da kod indukovanih napona od 1000 V po kilometru ne pređe vrednost 0,1.

Visokofrekventne četvorke za 252 kHz treba da imaju nominalni radni kapacitet 26,5 nF/km.

Nominalna vrednost realne komponente karakteristične impedance merene na 120 kHz treba da iznosi 174 ohma.

Ova vrednost ne sme da se razlikuje za više od $\pm 5\%$ od nominalne vrednosti.

Slabljene preslušavanja na daljem kraju ne sme biti mnogo manje od 7,8 N/230 m a na bližem kraju ne manje od 6,4 N/230 m.

Električne karakteristike niskofrekventnih četvorki sa i bez korišćenja fantomnih kola: Nazivna vrednost radnog kapaciteta 35 nF/km, bez fantomnih kola.

Standardna dužina 460 (426) metara.

Ponuđač može ponuditi i kablove dužine 230 (213) m. Za pupinizovane parice imaju se ugraditi potreban broj pupinovih kalemova induktiviteta 88 mH (80 mH) za korak pupinizacije 1830 (1700) metara i odgovarajući nastavci u koje se ugrađuju kalemovi.

Over the cable core has to be placed an aluminium sheath with a minimum thickness of 2 mm.

The Contractor shall, in dependance of the traction system, give the necessary construction of the cable sheath for mechanic and corrosion protection.

The cable must be armoured with at least two steel bands of a minimum thickness of 0.8 mm previously coated with compound masses.

The steel bands to be wrapped with a minimum clearance of 33 1/3% of the width of the steel band.

Kind and construction of the internal and external protective sheaths are left to the Contractor's choice provided that the armouring satisfies all conditions of good protection.

The loop resistance of the conductor \varnothing 1,2 and 0,9 must not exceed 31,2 resp. 55,2 ohm/km.

The insulation resistance must not be below 10 G-ohm \times km at 20°C.

Dielectric strength: The cable must stand without breakdown for one minute an alternating tension with an effective value of at least 2000 V, 50 Hz, applied between the aluminium sheath and all other conductors connected together.

The cable must stand without breakdown for one minute an alternating tension with an effective value of 1000 V, 50 Hz applied between wires a and b of each pair.

The screening factor of the cable must not exceed 0.03 for induced tensions of 60—430 V/km, with the understanding that with induced tensions of 1000 V per kilometer it does not exceed the value of 0.1.

Carrier-frequency quads for 252 kHz must have a nominal working capacity of 26.5 nF/km.

The nominal value of the real component of the characteristic impedance measured at 120 kHz has to amount to 174 Ohm.

This value must not differ from the nominal value for more than $\pm 5\%$.

The crosstalk attenuation on the farther end must not be below 7.8 N/230 m, and on the nearer end not below 6.4 N/230 m. Electric characteristics of audio frequency quads with and without use of phantom circuits:

Nominal value of working capacity 35 nF/km, without phantom circuits. Standard length 460 (426) meters.

The Tenderer can offer also cable lengths of 230 (213) m.

For pupinized pairs have to be mounted the required number of Pupin coils with an inductivity of 88 mH (80 mH) for a step of pupinization of 1830 (1700) meters and corresponding connectors for pupin coils.

Za fantomne veze ugraditi odgovarajući broj kalemova induktiviteta 40 (36) mH. Frekventno područje n. f. parice je od 0—3.400 Hz. Slabljenje kod 600 Hz = od 52 mN/km za \emptyset 1,2 i za \emptyset 0,9 = od 70 mN/km.

Ispitivanje tehničkih karakteristika kabela mora da obuhvati 10% od ukupne dužine a ispitivanje vršiti u kadi sa vodom. Ima se isporučiti i potreban broj visokokvalitetnih kondenzatora za simetriranje kabela sa odgovarajućim nastavcima.

Pošto će kabel raditi pod gas kontrolom, kabel i svi kabelski pribor moraju da budu predviđeni za takav sistem rada. Na svakih 100 km kabela isporučiti po jednu garnituru alata i mernih instrumenata. Isporučeni kabel mora u svemu odgovarati ovim uslovima a ukoliko ovim uslovima nisu obuhvaćene sve karakteristične vrelične i zahtevi, važe preporuke CCITT i važeći propisi zemlje isporučioца za ovu opremu. Kabel isporučiti pod pritiskom i sa izolovanim krajevima sa mogućnošću kontrole na bubnjevima.

II. Signalno telekomunikacioni kabel sa koaksijalnim tubama malog prečnika $2 \times 1,2/4,4 + 1 \times 4 \times 1,2 - 120$ kHz $+ 8 \times 4 \times 1,2 + 12 \times 4 \times 0,9$ duž elektrificiranih pruga monofaznog sistema 25 kV, 50 Hz i jednosmernog sistema 3000 V.

Konstrukcija kabela treba u osnovi da bude:

koaksijalne tube malog prečnika $2 \times 1,2/4,4$ visokofrekventna zvezda četvorka $1 \times 4 \times 1,2$ niskofrekventna zvezda četvorka $8 \times 4 \times 1,2$ $12 \times 4 \times 0,9$

Sve visokofrekventne i niskofrekventne četvorce po konstrukciji i električnim karakteristikama odgovaraju u svemu uslovima za kabel dat u tački 1.

Koaksijalne tube malog prečnika su namenjene za prenos 300 telefonskih kanala u opsegu učestanosti od 60 — 1300 kHz.

Unutrašnji provodnik koaksijalne tube treba da bude izrađen od bakarne žice nominalnog prečnika 1,2 mm.

Spoljni provodnik koaksijalne tube treba da bude izrađen od meke bakarne trake koja u vidu šavne cevi obuhvata unutrašnji provodnik.

For phantom connections the corresponding number of coils with an inductivity of 36 (40) mH has to be built-in.

The frequency range of a A.F. pair is from 0—3.400 Hz.

Attenuation at 600 Hz \leq 52 mN/km for \emptyset 1,2 and for \emptyset 0,9 \leq 70 mN/km.

The testing of the technical characteristics of the cables must comprise 10% of the total length, and the testing has to be carried out in a tub filled with water.

The necessary number of high-quality condensers for cable balancing, with corresponding connectors has to be supplied.

Since the cable will operate under gas checking, the cable and all cable accessories have to be provided for such an operation system.

For each 100 km of cable one set of tools and measuring instruments has to be supplied.

The supplied cable has to correspond in all regards to these conditions, and — in case that these conditions do not comprise all characteristic sizes and requirements — the recommendations of CCITT and the regulations in force in the country of the Supplier of this equipment shall apply.

The cable has to be supplied under pressure and with insulated ends with the possibility of control on drums.

II. Signaling and telecommunication cable with coaxial tubes of small diameter $2 \times 1.2/4.4 + 1 \times 4 \times 1.2 - 120$ kHz $+ 8 \times 4 \times 1.2 + 12 \times 4 \times 0.9$ along lines electrified with 25 kV, 50 Hz single-phase system and 3000 V DC systems.

Basically, the construction of the cables has to be as follows:

coaxial tubes of small diameter	$2 \times 1.2/4.4$	$1 \times 4 \times 1.2$
carrier frequency star quand	$8 \times 4 \times 1.2$	$12 \times 4 \times 0.9$
audio-frequency star quad	$12 \times 4 \times 0.9$	

All carrier frequency and audio-frequency quads correspond in respect of their construction and electric characteristics in every regard to the cable described in Clause I. Coaxial tubes of small diameter shall be used for the transmission of 300 telephone channels in the frequency range of 60—1300 kHz.

The internal conductor of the coaxial tube has to be made of copper wire with a nominal diameter of 1.2 mm.

The external conductor of the coaxial tube has to be made of soft copper band which in form of a seam tube envelops the internal conductor.

Unutrašnji prečnik spoljnog provodnika treba da bude 4,4 mm.

Način izvođenja izolacije između unutrašnjeg i spoljnog provodnika ostavlja se na volju preizvođača s tim da koaksialna tuba zadovolji postavljene električne karakteristike ovih tehničkih uslova.

Spoljni provodnik treba da bude omotan sa dve celične trake debljine 0,1 mm i najmanje jednom papirnom trakom

Aluminijumski omotač kabela izvesti u sve-

mu prema uslovima datim u tačci I.

Mehaničko antikorodivnu zaštitu takođe iz-

vesti u svemu prema uslovima iz tačke I.

Otpor unutrašnjeg provodnika treba da bude manji od 16,5 oma/km.

Otpor spoljašnjeg provodnika treba da bude manji od 7,5 oma po km. za traku debljine 0,18 mm odnosno 8,5 oma po kilometru za traku debljine 0,15 mm.

Otpor izolacije svake fabričke dužine, meren između unutrašnjeg i spoljašnjeg provodnika sa 800 V eff, 50 Hz ili 1200 V = za vreme od 2 minuta, ne sme biti manji od 10 Goma × km, a za dužine manje od fabričke ne sme biti manji od 25 G-oma. km.

Otpor izolacije između spoljašnjih provodnika i omotača ne sme biti manji od 10 G-oma. km, merene sa 2000 V efekt. 50 Hz za vreme od 2 minuta.

Srednja vrednost realnog dela karakteristične impedance na 1 MHz treba da bude 75 oma.

Faktor refleksije za 90% fabrikacionih dužina jedne pojačavačke sekcije ne sme biti veći od 5%, za 20% ne veći od 10%.

Ostale električne karakteristike koaksialne tube treba da odgovaraju u svemu preporukama CCITT odnosno UIC za ovu vrstu kabla.

Redukcioni faktor kabla treba da bude prema uslovima datim u tački I.

Standardna dužina pakovanja treba da bude 460 (426) metara, odnosno 230 (213) metara. Uz ponudu za isporuku kablova i kablovskog pribora ponuđač je obavezan da priloži tačnu specifikaciju i crteže kompletne opreme i pribora.

Takođe isporučiti na svakih 100 kilometara kabla po jednu garnituru alata i instrumenata.

Ukoliko ovom specifikacijom nisu obuhvaćeni svi tehnički detalji u pogledu konstrukcije kabla, električnih karakteristika i metoda merenja isti moraju odgovarati preporukama CCITT-a najnovije izdanje, UIC-a i

The internal diameter of the external conductor has to amount to 4,4 mm.

The way how the insulation between internal and external conductors will be realized is left to the choice of the manufacturer with the understanding that the coaxial tube has to satisfy the required electric characteristics of these Technical Conditions.

The external conductor has to be wrapped by two steel bands 0,1 mm thick and at least one paper band.

The aluminium sheath of the cable has to correspond in all respects to the conditions contained in Clauses I.

The mechanical and corrosion protection has also to be carried out in all respects in accordance with the conditions of Clause I.

The resistance of the internal conductor has to be below 17,6 Ohm/km.

The resistance of the external conductor has to be below 7,5 Ohm per km for 0,18 thick band and 8,5 Ohm per km for 0,15 mm thick band.

The insulation resistance of each manufacturing length, measured between internal and external conductors with 800 V eff, 50 Hz or 1200 V DC during two minutes, must not be below 10 G Ohm × km, and for lengths shorter than manufacturing lengths below 25 G Ohms × km.

The insulation resistance between the external conductor and the sheath must not be below 10 G Ohm × km, measured with 2000 V eff, 50 Hz during 2 minutes.

The mean value of the real part of the characteristic impedance on 1 MHz has to amount to 75 Ohm.

The reflectivity for 90% of manufacturing lengths of one amplifier section must not exceed 5%, and for 20% it must not exceed 10%.

The other electric characteristics of a coaxial tube have to correspond in all regards to the recommendation of CCITT resp. UIC for this kind of cables.

The screening factor of the cable has to correspond to the conditions contained in Clause I.

The standard packing length has to be 460 (426) meters, resp. 230 (213) meters.

The Tenderer is obliged to attach to the Tender for the supply of cables and cable accessories a correct specification and drawings of the complete equipment and accessories.

For every 100 kilometers of cable one set of tools and instruments has to be supplied.

In case these conditions do not contain all technical data in respect of the construction of cable, electric characteristics and measuring methods, these have to correspond to the recommendations of CCITT (latest edition), UIC and to the regulations of the

uslovima zemlje isporučioca, koji se odnose na kablove za daleke veze.
Najmanja količina kabla koja se ispituje iznosi 10% od ukupne dužine.

Kabel se ima ugrađivati po tehničkim uslovima za građenje železničkih pruga (knjiga III br. 1960/63 izdanje Jugoslovenskih železnica).
Investitor će u tehničkim podlogama dati potrebne podatke za određivanje količina kao i kategorije zemljista u koje se polaze kabel.

III. Uvođenje kablova u stanicu i objekte duž pruge i kablovski pribor

Kabel se uvodi u stanice u prostorije koje određuje investitor.
U početnu, krajnju i međustanicu kabel ulazi odnosno izlazi ceo.
U objekte duž pruge između stanica uvode se otcepni kablovi koji moraju da imaju iste karakteristike kao i pružni kablovi.

Kapacitet otcepnih kablova odrediti na osnovu broja veza i uređaja koji broj je dat u tehničkim podlogama.

Pri ovome težiti da bude što manji broj vrsta otcepnih kablova po kapacitetu.

U stanicama se kablovi završavaju na posebnim razdvojnim kablovskim glavama.
Ove kablovskе glave smestiti na kablovski okvir koji jednovremeno služi za smeštaj translatora, osigurača i razdelnika.

Sve kablovskе glave moraju biti izvedene sa najboljim električnim i mehaničkim karakteristikama.

Otcepni kablovi, isto tako, treba da se završavaju na razdvojnim kablovskim glavama.
Ove kablovskе glave smestiti u telefonske objekte ili u ormane APB.

Sve razdvojne kablovskе glave u stanicama i u objektima na pruzi treba da budu tako izvedene da su veze grupisane po vrstama i nameni za signale, odnosno telekomunikacione uređaje s tim da se prilaz signalnim paricama omogući samo ovlašćenim licima.
Redosled parica na kablovskim glavama mora da bude isti za celu deonicu pruge.

Plašt kabela treba izvoditi na posebnu izolovanu spojku. U tehničkim podlogama date su namene parica a ponuđač može da odredi samo redosled parica u kabelu.

Pravi, račvasti, kondenzatorski i pupinski kablovski nastavci, moraju u osnovi da odgo-

Supplier's country referring to long distance cables.

The minimum quantity of cables which shall be tested amounts to 10% of the total length.

The cable has to be installed according to the Technical conditions for the construction of railway lines (Volume III, No. 1960/63, edition of the Yugoslav Railways).

In the Basic technical documentation the Investor shall give the necessary data for specifying the quantities and the soil categories into which the cable will be laid.

III. Installation of cables in stations and structures along the line and cable accessories

The cable is installed in stations in the premises determined by the Investor.

A complete cable is led into and out of the terminal and intermediate station.

In the structures along the line, between the stations, branch cables are installed which must have the same characteristics as the line-side cables.

The capacity of branch cables shall be determined on basis of the number of connections and equipments which is given in the Basic technical documentation.

It has to be aimed at reducing to a minimum the number of types of branch cable as per capacities.

In stations the cables terminate by separate cable distribution heads.

These cable heads have to be placed on the cable rack which at the same time serves for the placing of translators, fuses and distributing frames.

All cable heads have to be manufactured with the best electric and mechanic characteristics.

The branch cables have also to terminate on cable distribution heads.

These cable heads have to be placed in telephone structures or in the cases of the automatic block system.

All cable distribution heads in stations and in structures on the line have to be installed in such a way that the connections are grouped by kinds and application for signaling and/or telecommunication equipment with the understanding that the access to the signal pairs is permitted only to official persons.

The sequence of pairs on cable heads must be the same for the whole line section.

varaju kapacitetu i dimenzijama kabla, da sadrže olovne i gvozdene spojnice i da su konstruisani za rad kabela sa gas-kontrolom.

The cable sheath has to be connected to a special insulated connector. The purpose of each pair is given in the Basic technical documentation and the Tenderer may specify only the sequence of pairs in the cable.

Straight, branching, condenser and pupinized cable connectors have basically to correspond to the capacity and size of the cable, to contain lead and iron connectors and to be constructed for the work of cables under gas checking.

IV. Zaštita od električnih uticaja i uzemljenje

Zaštitu od smetnji i opasnosti koji nastaju od uticaja energetskih i atmosferskih struja na svim kablovima, kablovskom priboru, VF pojačivačima i ostalim uređajima, izvesti po važećim jugoslovenskim propisima i preporukama CCITT i UIC odnosno propisima zemlje izvođača.

IV. Protection from extraneous electric interference and earthing

The protection from disturbances and dangers caused by the extraneous electric interference and atmospheric currents on all cables, cable accessories, carrier frequency intermediate repeaters and other equipment, has to be carried out in accordance with the ruling Yugoslav regulations, and the recommendations of CCITT and UIC resp. the regulations of the Contractor's country have to be applied.

V. Uredaji za gas-kontrolu

Uz opremu kabela isporučiti kompletne uređaje za zaštitu kabela pomoću gasa pod pritiskom. Sa ovom kontrolom mora se obezbediti ispravno funkcionisanje kabela, javljanje kvarova, kao i brza i laka lokacija kvara na kabelu.

Uređaji za gas-kontrolu se odnose na sve pružne kombinovane signalno-telekomunikacione kable, s tim da investitor može na pojedinim deonicama da odustane od ove kontrole.

V. Equipment for gas checking

With the cable equipment have to be supplied complete devices for the protection of cables by gas under pressure.

This checking has to provide a correct functioning of cables, indication of defects, and quick and easy location of defects on the cable.

The gas checking devices are applied to all combined lineside signaling and telecommunication cables, understanding that for some sections the Investor can desist from this checking.

VI. Kablovi za stanične lokalne veze

Sva službena mesta u reonu stanice treba da budu povezana lokalnim kablovima da bi se izbeglo višestruko otvaranje kabela u stanici.

Podatke o broju i vrsti lokalnih priključaka daće investitor u tehničkim podlogama.

VI. For the maintenance of the line-side and local cables

The Tenderers have to offer sets of tools for the working and maintenance of cables, sets of instruments for measuring and indicating the disturbance location on the cable with the aid of gas, as well as complete sets of instruments for measuring the values and characteristics of the cable transmission.

All operating posts in the station area have to be connected by local cables in order to avoid a multiple branching of cables in the station.

Data in respect of the number and kind of the local connections shall be given by the Investor in the Basic technical documentation.