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WIRING CONDUCTORS WITH FILM OR FIBROUS AND POLYVINYLCHLORIDE (PVC) INSULATION.

PARTICULAR TECHNICAL SPECIFICATIONS.

TY 16.505.437-73.

I 1948

Translated By	: A.Y.RAJU	ORDNANCE FACTORY PROJECT, HYDERABAD
Checked By	: SLESSOV	
Typed By	: M.P.JAYANTHI	Total No. of sheets: (20)
Edited By	: SEBASTIAN	
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Approved By	:	

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WIRING CONDUCTOR WITH FILM OR FIBROUS AND POLYNINYLCHOLRIDE (PVC) INSULATION.

PARTICULAR TECHNICAL SPECIFICATIONS.
TY 16.505.437-73.

Present particular Technical specifications, hereinafter referred to as „ЧТу", deal with wiring conductors with film or fibrous and polyninylchloride (PVC) insulation, hereinafter referred to as "Wire" , are used inside device and between devices for connecting of electrical device, at the voltage specified in table 1, and in the temperature range from -50 to +70°C.

Table 1.

Section, mm^2	AC Voltage, with frequency 2200 Hz, V	DC Voltage V.
0,08-0,14	380	500
0,20-1,5	1000	1500

List of Technical papers, on which the references are given in the present particular technical Specifications, are shown in the appendix.

Example designation of wire grade МГШВ with cross section 0,5 mm^2, insulated with two layers of silk and polninylchloride of red colour; while ordering and recording in Technical papers of other articles:

Wire МГШВ 0.5 КТу 16-505-437-73.

1. Reference to general Technical Specifications.

1.1. Conductors should meet the general technical specifications on wiring conductor hereinafter referred to as "ОТУ".

2. TECHNICAL REQUIREMENTS.

2.1. Wires should comply with requirements of present particular Technical Specifications.

2.2. Grade and dimensions.

2.2.1. Wires are graded as follows:

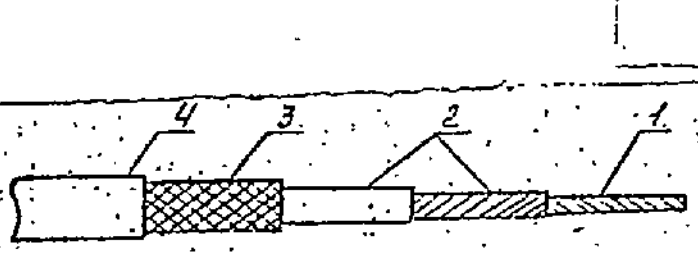

Рис. 1

FIG. 1

Grade	Description
МШВ-1	Wiring conductors with film and polyvinyl-chloride insulations.
МШВ	Wiring conductors with fibrous and polyvinylo-chloride. (PVC) insulations.
МГШВ-1	Wiring conductors flexible with film and polyvinylchloride (PVC) insulations.
МГШВЭ-1	-do- ; screened.
МГШВ	Wiring conductors flexible with fibrous and polyvinylchloride (PVC) insulations.
МГШВЭ	- do - ; screened.
МГШВЭ В	- do - ;screened in polyvinyl chloride sheathing.

2.2.2. Design dimensions of wires should correspond to the valvoe, shown in the table 2.

2.2.3. Construction length of wires should bo not less that 50m.

Wires with length fro 5 to 50m compriso not more than 30% of the deliverod batch.

Delivery of the wires of any length Ep allowod upon agreement.

2.3. Design:

2.3.1. Design of wires should comply with that shown in Fig. 1:

1. Current carrying core normal stength made of copper wire tinned with stannic-lead solder is made as per GOST 1956-70;

2. Composite insulation with insulating film or with 2layers of triacotate rayon, coated on current conducting coro in mutually opposite directions, and coated with a layer of polyvinylchloride of plastic compound.

3. Sereon from copper wire tinned with stannic lead colder with standard content of time of not less than 61%.

4. Sheathing of polyvinylchloride of plastic compound.

2.3.2. Current conducting core should comply with requirements item 3.2.3 OTY.

2.3.3. Flashes, Roughness and ribbings on the surface of insulation and sheel are not allowed, if they bring external diameter of wire beyound the limits of tolerance, stipulated in the present particular technical specifications.

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2.3.4. Colour wires are manufactured colouring of insulation and sheathing should be continuous and should co respond table No. 3.

Table 3.

Colour	Designation
~~Red or pink~~	
Red or pink	K
Blue or sky-blue	C
Black or Violet	Ч
Yellow or orange	
Brown	K_4
Green	З
Natural white or gray	Б

2.3.5. Screen, laid on one, two (laid parallely) or three (twisted insulated cores, should be made of copper wire with normal diameter which not exceed 0.15 mm, coat with stannic-lead soldering with normal contents of tin not exceeding 61%. Density of screen not less than 70%.

Cores under the screen should have different colour.

2.3.6. Materials used for manufacturing the wires.

- tinned copper wire.
- stannic - lead solder grade not below ПОС-61 GOST 21930-76.
- triacotate rayon.
- Insulating plastic film.
- Polyethylene terephthalmic strap.
- Polyvinylchlorido plastic compound.

TABLE 2.

Grade of wire.	Number of cores and rated cross section, mm^2	Number and diameter of tinned copper wires, mm.	DC of current conducting core ohms/km, max.	Rated radial of thickness of insulation mm.	External diameter of wire mm, Minimum	External diameter of wire mm, Maximum	Calculated mass of wire kg/km.
МШВ-1	0,35	1x0,68	57	0,40	1,4	1,8	5,3
"	0,50	1x0,80	38	0,40	1,5	1,9	7,0
"	0,75	1x0,97	26	0,45	1,8	2,2	10,1
"	1,0	1x1,13	19	0,45	2,0	2,4	11,7
"	1,5	1x1,37	12	0,45	2,2	2,5	17,5
МГШВ-1	0,35	10x0,15	60	0,40	1,4	1,8	5,5
"	0,50	16x0,20	40	0,40	1,7	2,1	7,5
"	0,75	24x0,20	27	0,45	2,0	2,3	10,9
"	1,0	32x0,20	20	0,45	2,2	2,5	13,5
"	1,5	19x0,32	13	0,45	2,4	2,8	12,1
МГШВЭ-1	0,35	19x0,15	60	0,40	-	2,4	14,4
"	0,50	16x0,20	40	0,40	-	2,7	16,9
"	0,75	24x0,20	27	0,45	-	3,2	22,8

Grade of wire	Number of cores and rated cross section, MM²	Number and diameter of tinned copper wires, MM.	DC Resistance of current conducting core ohms Km, max.	Rated radial of thickness of insulation MM.	External diameter of wire mm. Minimum	Maximum	Calculated wire kg/km.
МГШВ -1	2x0,35	19x0,15	60	0,40	-	4,3	27,5
"	2x0,50	16x0,20	40	0,40	-	4,9	33,5
"	2x0,75	24x0,20	27	0,45	-	5,4	43,2
"	3x0,35	19x0,15	60	0,40	-	4,6	34,2
"	3x0,50	16x0,20	40	0,40	-	5,1	42,3
"	3x0,75	24x0,20	27	0,45	-	5,9	55,2
МГШВ	0,08	1x0,32	260	0,20	0,7	1,0	1,5
"	0,20	1x0,52	98	0,35	1,1	1,6	3,0
"	0,35	1x0,08	57	0,40	1,4	1,9	577
"	0,50	1x0,80	38	0,40	1,6	2,0	7,4
"	0,50	1x0,97	26	0,45	1,8	2,3	10,4
"	1,0	1x1,13	19	0,45	2,0	2,6	12,0
"	1,5	1x1,37	12	0,45	2,2	2,7	18,0
МГШВ	0,12	7x0,15	167	0,20	0,9	1,3	2,23
"	0,18	18x0,10	143	0,20	0,9	1,4	2,44
"	0,20	7x0,20	100	0,30	1,2	1,6	3,9
"	0,35	19x0,15	60	0,40	1,4	1,9	5,9
"	0,50	16x0,20	40	0,40	1,7	2,2	7,9
"	0,75	24x0,20	27	0,45	2,0	2,5	11,4
"	1,0	32x0,20	20	0,45	2,2	2,8	14,1
"	1,5	19x0,32	13	0,45	2,4	3,0	19,1
МГШВ	0,12	7x0,15	167	0,20	-	1,9	8,9
"	0,14	18x0,10	143	0,20	-	2,0	9,0
"	0,20	7x0,20	100	0,30	-	2,2	10,3
"	0,35	19x0,15	60	0,40	-	2,5	14,9
"	0,50	16x0,20	40	0,40	-	2,8	17,5

Contd of Table 2/--

Grade of wire	Number of cores and rated cross section, MM²	Number and diameter of tinned copper wires, MM.	DC Resistance of current conducting core ohms km, max.	Rated radial of thickness of insulation MM.	External diameter of wire MM. Minimum	Maximum	Calculated mass wire kg/km.
МГШЭ	0,75	24x0,20	27	0,45	-	3,3	23,5
"	2x0,35	19x0,15	60	0,40	-	4,6	29,4
"	2x0,50	16x0,20	40	0,40	-	5,2	35,5
"	2x0,75	24x0,20	27	0,45	-	5,8	46,3
"	3x0,35	19x0,15	60	0,40	-	4,9	38,3
"	3x0,50	16x0,20	40	0,40	-	5,4	44,8
"	3x0,75	24x0,20	27	0,45	-	6,8	59,1
МГШЭВ	0,12	7x0,15	167	0,20	-	2,9	14,0
"	0,14	18x0,10	143	0,20	-	3,0	14,2
"	0,35	19x0,15	60	0,40	-	3,5	22,3

NOTE: Designs of core 8x0.15mm is allowed for wires of section 0.14 mm^2 upon agreement.

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2.4. ELECTRICAL PARAMETER.

2.4.1. DC resistance of current conducting core should comply with requirements of table2.

2.4.2. The wires sho ld with stand the AC test voltage with frequency 50 Hz for 1mm.

800V for cross section from 0.08 to 0.14 mm^2.
2000V for cross section from 0.20 mm^2 and more.

2.4.3. Insulation resistance of wires at temperature 20°C should be not less than 20000 megohms.

2.4.4. Insulation resistance, after keeping sho wire for 4 hours at the temperature of 70°C should not be less than 100 megohms.

2.5. Stability to mechanical effects.

2.5.1. Wires should not vibration resistances at temperature -50°C.

2.5.2. Wires should be stable to the effect of vibratory load with frequency to range 1 to 2000 Hz with acceleration upto 15g.

2.5.3. Wires should be stable to the effect of multiple impacts with acceleration upto 40g and single inspects with acceleration upto 150g.

2.5.4. Wires should be stable t. the effect of linear (centrifugal) load with acceleration upto 150g.

2.6. STABILITY TO CLIMATIC EFFECTS.

2.6.1. Wires should be heat-resistant to the continuous action of a temperature of 70°C.

2.6.2. Wires should be stable to the effect of short time (not exceeding 10 min) temperature 150°C without rousing them.

2.6.3. Wires should be cold resistant to the effect of a temperature of -50°C.

2.6.4. Wires should be stableto the cyclic action of temperature from -50 to 100°C (not more than 3 cycles).

The wire should withstand the test voltage as per item 2.4.2. (of Ty) particular Technical Specifications after cyclic action of temperature.

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Insulation resistance should be not less than 10000 meg.hms.

2.6.5. Wires should be moisture-resistnt at relative air humidity upto 98% at temperature +40°C.

As a result insulation resistance should not be less than 1000 megohm.

2.6.6. Wires should with stand the effect of increased atmosphere pressure upto atm and lower pressure upto 5mm Hg,

2.6.7. Wires should not Spread the flame.

2.7. Durability.

2.7.1. Service life of wires is 12 years, including their storage, operating hours of wires at max working temperatures is 1000 hrs, If the customer observes mounting rules, approved in established manner and ensures operating and storage conditions setup by the present technical specifications.

Service life is counted from moment of dispatching the wires to the customer including storage life in store house at customer.

Change of the wire characteristics during the service life are not standardised by present particular technical specifications but the wire should be serviceables.

Serviciability of wires is known as the capacity of satisfying the following the requirements after 12 years service life and storage.

a) Wires should withstand without breakdown the foll AC voltage at frequency 50 Hz for 1 min.

- 600V for cross section 0.08 to 0.14 mm^2.

-1500V for cross section 0.20 mm^2 and more.

b) Wires should withstand the bending at temperature minus 25°C on cylinder with radius equal to 10 times of with diameters without cracks on the polyvinylchloride (PVC) insulation.

2.8. MARKING.

2.8.1. Wires should have marking of given by manufacturer.

Marking is carried out with indentification colour thread.

2.8.2. Each coil (pack) with wire should be provided with lable (tag), to indicate:

- trade mark of manufacturer.
- grade of wire.
- section, mm^2,
- length, m.
- date of issue (month, year).
- number of the present particular technical specifications.
- stamp of technical inspection,
- stamp of customer's representative, if accepted.

2.8.3. The tag fastened to the box or bag should indicate:

- trade mark of manufacturer.
- grade of wire.
- section, mm^2.
- length, m.
- packing date (month, year).

2.9. PACKING.

2.9.1. Wires should be delivered coils. Coils should be tied not less than at three places and wrapped packing material.

Not more than three places of same grade, sections and colour are allowed in one coil.

It is permitted to pack several coils of the same grade sections and colours in one bundle. Mass of bundle should be not exceed 15 kg.

Coils or bundles should be packed in the boxes or bags made of packing fabric for transporting by railway.

Mass of box with wires should not be more than 50kg, bag-30kg.

Packing of bundles in bag or bags, and not one, if wires are delivered in container.

3. ACCEPTANCE RELES.

3.1. The wires are delivered for acceptance by Technical inspection and customers representative in batches.

A batch is a number of coils of same grade and section simultaneously submitted to acceptance which do not exceed 20 kg.

3.2. Acceptance of wires is carried out in compliyance with requirements of table 3 of the present Technical Specifications.

3.3. Test as per Item 2.7.1. is not carried out but guaranteed by design of wire and materials used.

Tests as per the items 2.5.2., 2.5.3, 2.5, 4.2.6.6. refer to the type ones.

3.4. When the customer checks the quality of delivered wires, rules and methods of testing, specified in OTy and ЧТу are to be applied.

TABLE 3.

No.	Characteristics.	Item of Technical specifications.		Item of testing procedure		Samples selected from batch for acceptance by Technical inspection min.	Test category
		OTy	ЧТу	OTy	ЧТу		
1.	Design parameters. a) design of core	3.2.2 3.2.3	Table 2.	5.2.1.	-	5%	acceptance test
	b) thickness of insulation	-	Table 2.	5.2.1	-	5%	"
	c) density of screen.	3.2.6	2.3.4	5.2.3	-	5%	"
	d) external diameter.	3.3.7	Table 2.	5.2.1	-	100%	"
2.	Appearance	-	2.3.3 2.3.4 2.3.5	-	4.2.1	"	"

No.	Characteristics.	Item of Technical specifications.		Item of testing procedure		Samples selected from batch for acceptance by Technical Inspection in.	Test category
		OTY	uTY	OTY	uTY		
3.	DC Resistance of current conducting core	3.3.1	Table 2	5.3.1	-	5%	"
4.	Test voltage (a.C)	3.3.2	2.4.2	5.3.2	-	100%	Accepted test.
5.	Insulation resistance in the standard conditions	3.3.3	2.4.3	5.3.3	-	5%	
6.	Insulation resistance at temperature 70°C	3.3.3	2.4.4	5.3.3	-	3 samples	Periodical
7.	Resistance to vibration at temperature50°	-	2.5.1	-	4.3.1	5 samples	"
8.	Stability during the action of vibratory load	-	2.5.2	-	4.3.2	"	Type
9.	Stability to multiple and single impacts.	-	2.5.3	-	4.3.3	"	"
10.	Stability to linear load.		2.5.4		4.3.4	5 samples	Type
11.	Heat resistance	3.5.1	2.6.1	5.5.1	4.4.1	"	Periodical
12.	Short time action of increased temperature	-	2.6.2	-	4.4.2	"	"

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No.	Characteristics.	Item of Technical specifications.		Item of testing proceudre		Samples selected from batch for acceptance by Technical inspection Min.	Test category
		OTY	uTY	OTY	uTY		
13.	Cold resistance	3.5.2	2.6.3	-	4.4.2	5 samples	Periodical
15.	Stability to cycling temperature change.	3.5.4	2.6.5	5.5.5	-	"	"
13.	Moisture resistance	3.5.3	2.6.5	5.5.3	-	"	"
16.	Stability to increased and decreased pressure.	-	2.6.6	-	4.4.3	"	Typo
17.	Non-propagation of flames	3.6	2.6.7	5.6	-	5 samples	Paridical.

NOTE: Minimum number of samples for testing by representative of customer is 5%.

4. TEST PROCEDURE.

4.1. Test procedure should correspond to OTY table 3 and items of the present particular Technical Specifications given below.

4.2. CHECKING OF DESIGN.

4.2.1. Quality of surface of insulation, screen, sheathing of colour of insulated cores and sheathing are checked by vusually by without use of magnification devices for compliace with requirements of the present particular technical specifications of items(2.3, 2.3.4, 2.3.5)

4.3. CHECKING OF STABILITY TO MECHANICAL EFFECTS.

4.3.1. Checking the correspondence to the requirements (Item 2.5.1) is carridout on samples with length of 0.65mm (figure 4).

Samples are placed in vibration device and strongly fastened.

Place vibration machine with samples in cold chamber for one hour at temperature -50 ± 2°C, and then switch on the machine.

After 30min vibration with frequency 100 ± 10 Hz with amplitude 0.5 to 1.0 mm at specified temperature, insulation of wire should not have bractures and ruptures, visible to naked eye.

4.3.2. Checking for stability to action of vibrating load (Item 2.5.2) is carried out on the samples with length 1m according to the method 103-11 as per GOST 16962-71.

Before testing, wind the samples around metal rod with diameter equal 20 times of wire diameter, carry out the visual inspection test with operating voltage and then strongly faston to vibration stand table in horizontal position.

After checking the vibration resistance, wire samples should with stand the testing with operating voltage in correspondence with GOST 2990-78.

4.3.3. Checking for stability to the action of multiple and single impact (clause 2.5.3) is carried out on samples of wire length 1m according to the methods 104-1 and 106-1 as per GOST 16962-71.

Before testing, wind the samples in the metal rod with diameters equally to 20 times of wire diameter carryout internal (visual) inspection of sample, test with working voltage, and they faston the samples in horizontal position on the table of impact stand.

After testing for impact resistance, sample wire should with stand the test with working voltage inco respondence with GOST 2990-78

4.3.4. Stability test to the action of linear (centrifugale) load (item 2.5.4) are carried out on samples of wire length 1M according to the method 107-1 as per GOST 16962-71

Before testing wind the sample metal rod with diameter equal to 20 times of wire, carryout the internal (visual) inspection on sample, test with working voltage, and strongly faston the samples in centrifugal machine, plat form.

After testing for stability to the action of liner (centrifugal) loads, sample wire should with stand the test with working voltage incorrespondence with GOST 2990-72.

4.4. TESTING FOR STABILITY DUE TO CLIMATE ACTION.

4.4.1. Test for comply with requirements of clause 2.6.1 is carried out on the sample length 0.3 m. Twist the samples in 5 turns of length 50mm and load in parffin at temperature 130±5°C for 5 min.

After removal from paraffin and cool the sample for 1 hour wires are retwisted. In this case, there should not be adhesive on insulation or cracks on it surface, visible to unaided eye.

4.4.2. Test for comply with requirements clause 2.6.2 is carried out on samples of wire with a length of 0.65 m (figure 2).

a) fix the (wire) sample in rectifier condition in the device between two parallel rods with diameters 2mm, perpendicular to the sample. Load the upper rod with weight 100g.

Place the device with sample in heating chamber at temperature + 100 ± 5°C for 1 hour.

Samples are taken out from heating chamber and device load in in the water with temperature + 15 to 20°C. Takeout the ends of samples from surface water on 50 to 60mm. Apply voltage between core wire and water.

1. Cargo
2. Rods.
3. Sample of wire.
4. Figure 2.
5. Rod.
6. Cargo
7. Sample of wire
8. Voltage.
9. Figure 3.
10. Fastening the samples.
11. Sample of wire.
12. Figure 4.

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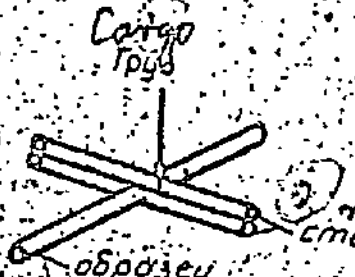

Рис. 2
FIG. 2

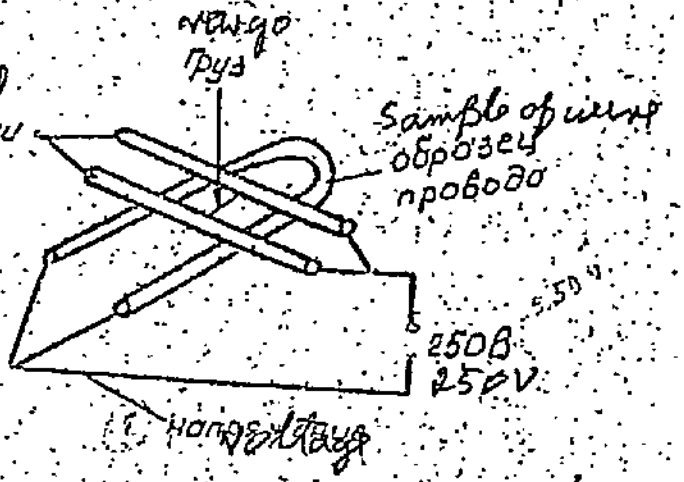

Рис. 3
FIG. 3

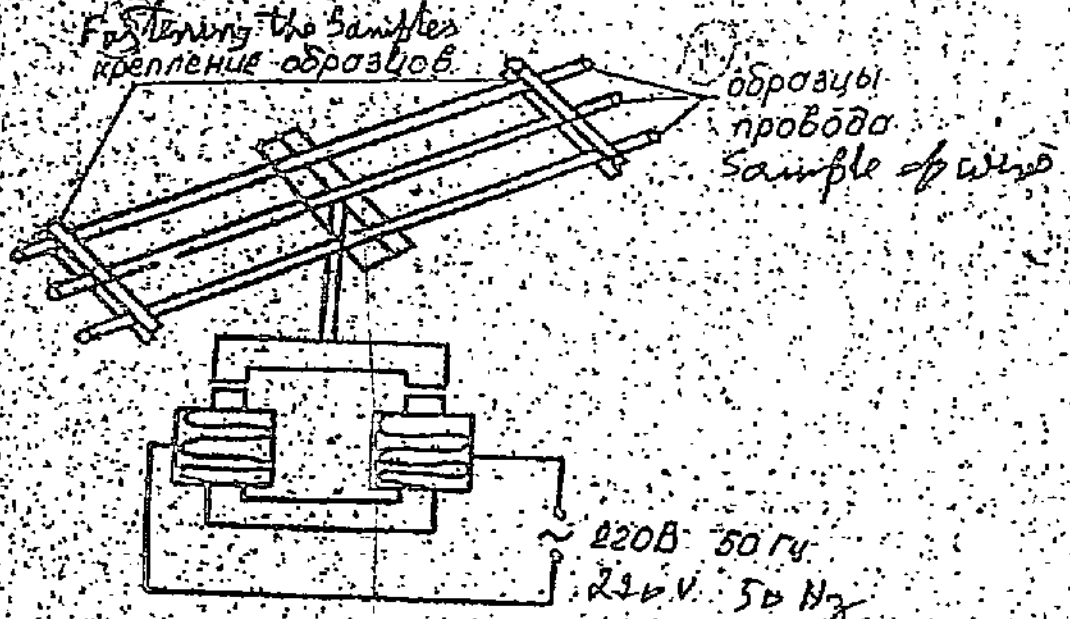

FIG. 4

6. GUARANTEE.

6.1. Wire should be accepted by technical control of manufacturing plant manufacturing plant gives Guarantee conformity of the wires with requirements of present particular technical specifications if customer observes the conditions of use, transportation and storage, set-up by the technical specifications.

6.2. Guarantee period of storage of wires in conditions as indicated in the clause 5.1. in package of manufacturing plant, in the set of ЭИП, and also mounted in apparatus is set-up 12 years ~~монтаж в аппарат~~, ~~на~~ storage wires is allowed after their expiry of guarantee period of storage ~~в~~ the field conditions at temperature from -50 +50°C and relative humidity of air upto 98% (at temperature upto plus 30°C) for :

- 3 years in composition of apparatus and ЭИП if protected them from the solar radiation and moisture.

- 6 years in composition of hermetically sealed apparatus in ЭИП in hermetic packing.

Typed by: H.B.Jayanthi.

Samples should withstand the test of alternating current voltage not less than 80% of indicated in the clause 2.4.2. of the present particular technical specifications.

b) Place the bended sample in hinge view in the device between the base of device and two parallel metal rods perpendicular to the sample rods are loaded with cargo 800g for wires with fibrous insulation and 400g for wires with film insulation (figure 9).

Place the device with sample in heating chamber with temperature + 150 ± 5°C. After with standing in instructed temperature for 10min between core and rods a.c voltage 250 V is applied, = not taking out the load from the sample.

4.4.3. Checking the effect of and reduced atmospheric pressure (clause 2.6.6) is carried out on the samples with the length of 1.5m in pressure chamber according to methods 209-1 and 210-1 as per GOST 16962-71.

Wire is placed and holding it in the chamber, in which the test pressure of air is set.

After checking the effect of increased and decreased atmospheric pressure, wire samples should with stand the test with working voltage in correspondence with GOST 2990-78.

Testing with voltage is carriedout on drawn-out ends.

4.4.4. Testing for the correspance to the requirements clause 2.6.3, is carried out on samples length 0.65m. After staying in the cold chamber for 2 hours at temperature -50± 3°C, in straight condition, bend the samples smothly for 180° on cylindor at same temperature with radius, equally to 20 times of wire diameters during this on surface of wire should not be any cracks.

5. TRANSPORTING AND STORAGE.

5.1. Transporting and storage od wire are carried out in comply with requirments clause 7 as per MPTY 16-505.040-67.

No: 85055/OFPM/DS/87-CC

Notification No.77

Date: 16.05.87.

NOTIFICATION OF AMENDMENTS TO SPECIFICATIONS

The following Corrections/Amendments are now required to be carried out in the documents as below:

Documents details : TY 16-505437-73

OFPM Regn.No. : I 1948

Details of amendments:-

Sl.No.	Details	
1.	Ref	: page No.3, 2nd para after Table 1.
	Delete	: 'polninyl'
	Add	: 'Polyvinyl' to read as polyvinyl ehloride.
2.	Ref	: page No.5, 2.3.1 - (1)
	Add	: 'of' in between 'core' and 'normal' to read as 'Core of normal'
3.	Ref	: page No.6, 2.3.4, first line
	Delete	: colour wires are manufactured.
	Add	: 'Wires are manufactured in colours' (and start the next sentence with capital letter)
4.	Ref	: page No.7, Table 2, in the column of 'external diameter of wire" (Maximum) 9th row
	Delete	: 2.5
	Add	: 2.6

Contd.2/-

Sl.No. Details

5. Ref : page No.7, Table 2 in the column of 'calculated mass of wire kg/km' 9th row

Delete : 13.5
Add : 13.6

10th row
Delete : 12.1
Add : 19.1

6. Ref :

Page No.10, 2.5.1,

Delete : 'not vibration resistances'

Add : 'be vibration resistant'

7. Ref : page No.13, 3.1

Delete : 'complynand'

Add : "COMPLIANCE"

8. Ref : page No.15, Table No.3 in the column of item of testing procedure again-point 13. cold resistance.

Delete : 4.4.2

Add : 4.4.4

9. Ref : page No.16, 4.3.1, last para, third line

Delete : letter 'b' from bractures' and

Add : letter 'F' to read as FRACTURES

AWM/DS

('Thro' AWM/PDO)

AF/PDO

✓Copy to:CI,ICV.