THE DEVELOPMENT OF THE RIVER LAXÁ.

ELECTRICAL EQUIPMENT. - HYDRAULIC MACHINES. - PENSTOCK.
DESCRIPTION FOR TENDER. - TENDERS INVITED. - TERMS.

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I N D E X.

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I. DESCRIPTION FOR TENDER.

A. POWER STATION.

a. General Remarks.

Respecting general remarks on the arrangement of the development we refer to: "Description and Terms on which Tenders are invited for the Construction of a Power Plant on the River Laxá in Southern - Thingeyjar District", worked out by civil engineer Árni Pálsson.

Árni Pálsson's tender includes: dam, intake basin, excavations and cradles for penstock, power house with machine foundations, house at Akureyri for main transformer station, and dwelling houses for operators.

The power house will be built on the eastern bank of the Laxá a little above Brúarfossar (see pl.1). Utilized gross head is 37,5 m. Later on the dam may, however, be raised, first by 6,5 m, making the gross head 44 m; and later by 19,5 m, in which case the gross head would be 57 m.

The penstock is made of wood. It is 690 m long with an inside diameter of 2400 mm.

In the machine room of the power house there will at first be only one aggregate of a 2000 HP turbine with appertaining alternator. Yet both the machine room and that part of the power house which is intended for transformers, switch-gears etc. will at once be built for two units of 2000 H.P. machines, and besides the chief tender for one unit of a 2000 H.P. machine, an additional tender is desired, offering two mounted aggregates of 2000 H.P. machines with appertaining transformers, switch-gears etc.

To the south of the machine room and as a continuation thereof there are cells for transformers, switch-gears, meters, panels etc.,

but in the story immediately above there is a room for busbars, bush-switches, and terminats for transmission lines to Akureyri, Húsavík etc. (See plan No.L-371002 and plan 4).

The operation voltage of the alternator is 6000 volts, which is transformed to 30000 volts and the energy then transmitted at that voltage to Akureyri where it is again transformed to 6000 volts and the energy thus transmitted to the various transformer stations in the town, where the voltage is still reduced to 220 volt and the energy distributed at that voltage through the town.

b. Hydraulic Equipment and Hydraulic Machines.

1. Gates, Rocks, Intake Pipes at Dam.

At the dam there are two intake partitions (4,5 x 5,0 m) side by side (See Á.P.'s pl.2).

From the eastern partition the above-mentioned penstock lies down to the power house, but the western partition is intended for a pipe for a later extension. Right across the intake partition there lie iron beams to support the racks, and in the eastern partition there will at once be fitted a sufficiently wide rack, while the western partition will not be furnished with a rack until a new pipe is put there.

Both intake partitions are fitted with movable wooden gates and guiding frames of iron. These frames are cemented into intake walls (Á.P.'s plan 2).

The gates shall be made to open and close by hand-power. The eastern gate shall, moreover, be furnished with complete gear to open and close by electric power; necessary motors (3-phase 220 volts), proper lifting gear and accessories. The gate must be controllable from the power house (control room) and connected to a signal apparatus to show its position (from there). The electrical apparatus shall be made to be connected to an underground cable going out from the power house.

The western gate shall be so made that later on it may be fitted with similar lifting gear.

The gate-frames shall be fitted with crampits to be fixed in the walls.

West of the intake partition there is a bottom gate (Á.P.'s pl.2), with an iron guiding frame, to be cemented into walls of the bottom outlet. It shall be fitted with gear to open and close by hand-power.

Into the back wall of the intake partition funnel-shaped intake pipes are cemented (See plan 2). These are 3,6 m long steel pipes,

made of 8 mm thick steel plates. The lower end of the eastern intake pipe shall be connected with the woodstave pipe and the connexion furnished with the intake pipe.

2. The Penstock.

The penstock is shown on plans 1 and 3. It is an iron-banded woodstave pipe, 690 m long, inside diameter 2400 mm.

The pipe is to conduct water to two 2000 H.P. Francis turbines on horizontal shafts, making 500 revolutions a minute.

At the dam the pipe is connected with a steel pipe (intake pipe), which is cemented into the backwall of intake when the dam is constructed. This steel pipe has already been described.

At the lower end the pipe is fixed to distributing pipe, to be described below.

The water level at dam is + 106,5, which may later be raised to + 107,2 m. The water level in tail-race is at + 69,0 m thus making the gross head 37,5 m. In the intake partition the centre-line of the pipe is at + 102,8 m, at wall of power house + 71,8 m.

The pipe shall be so made as to allow the water level to be raised to + 113 m. This must be taken into account when the thickness of the planks for the pipe are fixed.

The strength of the iron bands may be calculated on the water level at dam being at + 107,2 m and the tension in iron neither exceeding 800 kg/cm^2 by static pressure nor 1000 kg/cm^2 by 15% pressure increase. When the water level is raised to + 113 m more iron bands will be required, unless the pipe is originally made for the corresponding pressure. The inside diameter of the pipe is 2400 mm, and the distance between the cradles must not exceed 3,5 m.

The water is clear and pure, with no sand or dirt or any other adventitious matter than that resulting from the vegetation in the river.

Material. The planks for the pipe shall be selected from the best kind of straight grown pine and cut from the rootend of the trunk. It must be altogether free from through-going knots, as well as every other kind of big knots. Nor must there be found a plank which has been cut off near a big knot, whether the knot lies along or through the plank. Stress must also be laid on the slit for the metal tongue in the end of every plank being very exactly cut, and on the ends being so evenly cut as to fit exactly together. The planks shall be planed cylindrically both inside and out. It is required that the

plank material be so abundantly supplied as to make it possible to discard such planks as may be considered faulty. The planks must be sufficiently broad according to a later agreement.

The planks must be quite dry, and care must be taken that they do not get wet on the way to the country. As regards bands, joint pieces and nuts, material, make and arrangement must be stated. These iron pieces, while in a hot condition, shall be dipped into hot pitch before they leave the factory.

There must also be furnished carbolineum and tar or some other material equally good and in sufficient quantities for the pipe to be impregnated twice after it has been put together, and pitch to paint the bands and joint pieces when they are put up.

3. Distributing Pipe.

A distributing pipe to connect the penstock with the pipe leading to the hydraulic machine (Á.P.'s plan 2). The distributing pipe must be wide enough to carry water to another 2000 H.P. turbine that will be added later. Until then one of the pipemouths shall be closed with a sufficiently strong iron lid. The distributing pipe shall be furnished with a manhole, and with an emplying valva on the bottom side.

An additional tender is invited for the distributing pipe made with a valva in its mouth or some other device, so that the later unit can be coupled on without the operations of the plant having to be stopped while it is being done.

4. The Turbine.

One aggregate of 2000 H.P. Francis turbine on a horizontal shaft, speed 500 revolutions a minute.

The turbine shall be able to generate 2000 H.P. on shaft at lowest net head, when from the gross head is deducted the loss of head, occasioned when sufficient water passes through the pipe to work 2 units of 2000 H.P. Francis turbines at full load. The turbine is directly coupled to the alternator.

The speed of the turbine must be regulated by an automatic oil-pressure regulator, and the pressure in the penstock regulated by a pressure regulator. Both regulator and fly wheel must work in such a way that the number of revolutions made by the turbine does not increase by more than 15 per cent beyond normal speed even though sudden variations of load may mount up to 100 per cent.

The pressure regulator must work in such a way that the pressure

increase in the turbine pipe at sudden fall of load even down to no-load, does not amount to more than 12% of gross head.

The turbine must be able to stand full increase of speed, even up to overspeed, without suffering any damage. Mention must be made what the increase in speed can amount to at overspeed.

Care should be taken that the above-mentioned stipulations are complied with, both while this unit is alone and after another 2000 H.P. aggregate has been added to the same pipe.

The efficiency of the turbine must be stated and guaranteed at 1/2 - 1/1 load.

The turbine, besides the usual spare parts, shall be furnished with all the necessary and usual accessories, as a water valve, fly-wheel, suction pipe, necessary curve tubes, emptying valve, a coupling for the alternator, meters to indicate the number of revolutions, pressure, and suction, as well as an apparatus to control the number of revolutions electrically.

There must be an apparatus to indicate the temperature of the bearings, both the machine itself and in the control room, and an automatic gear as well to stop the turbine if the regulator is seriously damaged, in case of too high temperature in the bearings of the turbine or alternator, or when any other breaks down occur of a kind that is injurious to the machines.

Besides the above-mentioned the turbine must also be furnished with pipes and curve tubes to connect it with the distributing pipe.

c. Alternators, Transformers, Switchgears.

1. Alternators.

One horizontal Three-phase alternator of a closed type, of 1800 kVA, 500 r/m., 6000 volt, 50 cycles a sec. The alternator shall be directly coupled to the turbine, and made for parallel operations with the alternators which may later be put up in the power house. The alternator shall be complete in every way, with a connected exciter, regulator and pipe mouths to be connected with passages for cooling as well as hot air from the alternator, and all necessary accessories and spare parts. There must also be an apparatus to indicate the temperature of bearings, stator winding in the control room, and also for thermal relays with apparatus to stop the turbine in case of excessive heating of the alternator (bearings or stator winding).

The efficiency of the alternator at 1/4 - 1/1 load and cos. = 0,8 must be stated and guaranteed. Its voltage should allow of an

increase of up to 10% beyond normal voltage. All parts of the alternator must be able to stand maximum strain which according to their position they may have to meet, as overspeed and sudden variations of load, from no load to full load.

2. Transformers.

In the power house there is one transformer of 1800 kVA, 6000/30000 volt. The alternator shall be of the core-type, oil-insulated and air-cooled. It shall be filled with oil. It shall be fitted with oil-tank and a pump for the oil.

Meters to indicate the temperature of the oil shall be located in the transformer, and in the control room some apparatus to show this temperature. The alternator shall moreover be equipped with Buchholz relay and thermal relay.

The transformer shall be made for parallel operations with the transformers that will be added later.

The transformer shall be accompanied by the necessary spare parts.

The connexion shall be delta connexion on the primary side and star connexion on the secondary side.

The efficiency of the transformer at 1/4 - 1/1 for cos. = 1 and 0,8, as well as no-load loss, shall be stated and guaranteed.

Besides the above-mentioned transformer, there shall be another transformer for 100 kVA 30000/220 volt for private use in the power station.

3. Switchgear, Meters and Signal Apparatus.

The arrangement of switchgear in the power station is shown on plan No. L-371002, and their connexion on plan No. L-371001.

Alternator and transformer are directly coupled through a bus-switch, but there are no special bus-bars for the alternators.

On the high-tension side of the transformer there are two-fold 30 kV bus-bars with which the transformer is connected through an oil circuit-breaker and two pairs of bus-switches.

In the house there is also room for similar units of alternator and transformer with appertaining switchgears for a later extension.

From the bus-bars a 30 kV overhead line goes to Akureyri. In this line there are two pair of bus-switches at the bus-bars, one oil-circuit-breaker and a bus-switch with earth connexion fittings.

From the bus-bars there will later be taken out a 30000 volt overhead line to Húsavík, for which and the necessary apparatus there is a room reserved. They, however, will not be erected till later

(shown on plan with broken lines).

The power house transformer is also connected with the bus-bars through two pair of bus-switches by the bus-bars and one oil circuit-breaker as well.

The meters are as follows:

An ampermeter and voltmeter for the exciter current, an ampermeter for the alternator, a wattmeter for unequally loaded phases; kVhr meter, cos. meter, frequency meter, and a voltmeter with a throw-over switch for measurement between all the phases and to the earth.

For the 30 kV bus-bars there are three voltmeters for measuring the voltage between all the phases, as well as a voltmeter with a throw-over switch for measuring to the earth.

For the overhead line to Akureyri there are ampermeters on all phases, kVhr-meter and registering wattmeter for unequally loaded phases.

For the meters there are proper current and voltage transformers and a fuse before the voltage transformers, which at the bus-bars are made as bus-switch fuses. The secondary side of the transformers is earth-connected.

Safety apparatus:

For alternator and transformer maximum current relays in all phases; common differential relays for alternator and transformer, and Buchholz relays for transformer. Besides this, there are thermal relays for the bearings of the turbine and alternator, stator winding of alternator and armatures of transformer, as already mentioned.

For the transmission line to Akureyri maximum current relays in all phases and an excess voltage valve.

For the power house transformer a maximum circuit-breaker.

Every oil circuit-breaker shall be fitted with distance control, so that they may be controlled from the control room.

At the neutral-point of the alternator there is an earth relay with appurtenant current transformer and resistance, but it is desired that a further earth-connexion protection be offered, so far as tenderer considers it necessary with a view to later extensions of the power station and distribution systems. Moreover, later extensions of the development should be had in view when the short-circuiting load of the apparatus is fixed.

The short-circuiting load for which the apparatus is made should

be stated as well as the maximum short-circuiting test for the alternator.

The voltage regulation shall be made fully with a perfectly reliable automatic voltage regulator, which besides keeping the voltage steady, can also increase it by up to 20% by an increased current load on the transmission line to Akureyri.

Meters, signal apparatus, regulators and relays shall be on panels in the control room. The signal apparatus (for light signals) and apparatus for sound signals shall be on a special board.

Meters for the alternator are on a control desk in the control room, where there must also be room for 5 other control desks for later extensions. There is also room there for corresponding panels for later extensions.

The lowtension side of the power house transformer is, through circuit-breaker and fuse connected with the lowtension net of the power house. The neutral-point of the transformer shall be earth-connected through a maximum voltage valve. A voltmeter with a throw-over switch for measurement between all the phases to the earth, an ampermeter, and a kVhr meter are also for the lowtension side. Besides the above-mentioned, the switch-board is also equipped with fuses for 7 circuit-branches.

For the control of the intake gate from the power house there shall be the necessary gear in the control room as well as the necessary underground cables (from there) to the gate-apparatus at the dam (Motors and apparatus up at the intake basin are furnished with a gate).

There is a rectifier to generate direct current for relays, reserve lighting etc. This is a 3-phase motor for 220 volt direct-coupled with a direct-current alternator of 5 kV 110/160 volt. The alternator shall be made for loading the electrical battery.

There is a switch-board for the direct-current with a voltmeter, two ampermeters, a throw-over switch, circuit-breakers and fuses for three circuit-branches.

The electrical battery is 110 volt 60 amperhours at three hours' unloading. It is equipped with a double regulator of cells and a complete apparatus for loading the battery. The elements of the battery shall be in glass cells.

The power station is lighted by the 3-phase low-tension system, and besides, the machine room, the control room, and the switch room

have a special reserve lighting from the 110 volt direct current system. The reserve lighting shall be automatically connected, if the lighting system of the 3-phase system carries no load.

d. Transportation Facilities in Power House.

1. Travelling Crane.

The machine room shall be equipped with a crane,made to lift and carry a twenty-five tons' weight, both along and across the machine room. Its span is about 12 m and it is worked by electricity. The crane shall be furnished with the necessary motors, rails and accessories.

In the workshop a similar 15-ton crane shall be put up and furnished with all the necessary apparatus, motors, rails etc.

2. A Truck for Transformers.

To transport the transformers and oil circuit-breakers there is a truck running on rails along the passage between the transformers and the oil circuit-breakers, all through the workshop into the machine room. It shall be made to carry 15 tons.

B. A HIGHTENSION LINE FROM LAXÁ TO AKUREYRI.

a. General.

The intended Laxá power plant is to stand by the so-called Brúarfossar. These falls are found in the river where it leaves Laxárdalur and enters Aðaldalur. The falls are about 35 km east of Eyjafjörður and some 14 km north of Akureyri. A bee-line between the falls and Akureyri is about 39 km long.

From the power station to Akureyri a 30 kV overhead transmission line will be constructed. It will be made of 3 x 50 mm^2 copper wire erected on single wooden poles with pin-type insulators. Owing to the mountain ranges on the way, the line will have to lie in considerable curves so that its whole length will amount to about 60,3 km.

On the way from Aðaldalur to Eyjafjörður there are three mountain ranges, namely,Fljótsheiði farthest to the east. East of Fljótsheiði are found Reykjadalur and Aðaldalur, while Bárðardalur and Kaldakinn are situated to the west of it. Fljótsheiði is in most places rather low (from 200 - 300 m above sea level); but it is fairly broad and domed. Where the high-road from Akureyri to the east lies across it, that is from Goðafoss (Fosshóll) to Einarsstaðir, it nowhere reaches the altitude of 300 m above sea level according the Ordnance Survey Map, where as from Árni Snævarr's survey it seems to exceed 300 m.

From the power station the transmission line first passes through the innermost part of Aðaldalur and then along Reykjadalur until it mounts up the Fljótsheiði. On this part of the way the trace is fairly good.

Across the Fljótsheiði the line lies just north of the main-road at an altitude of circa 300 m above sea level at most. The danger of ice covering the line on the Fljótsheiði is considered fairly great and there is much snow there in wintertime.

To the west and along the whole length of the Fljótsheiði from north to south there is a rather deep valley, called Bárðardalur, from the south and past Goðafoss, and then Kaldakinn down to the sea (Skjálfandi). Through this valley there flows the Skjálfandafljót. The main-road lies across the valley just north of Goðafoss in Skjálfandafljót, at the height of about 120 m above sea level.

To the west of Bárðardalur and Kaldakinn there is a high and broad mountain range, cut through by a fairly broad and deep pass,

the Ljósavatnsskarð, in which is found a biggish lake, called Ljósavatn, at 111 m above sea level. On the east Ljósavatnsskarð begins where Bárðardalur and Kaldakinn meet, whence it cuts west and a little to the north, through the mountains to the valley of Fnjóskadalur.

The transmission line passes down the Fljótsheiði about 1,5 km north of the main-road, and thence straight across Bárðardalur to the south-eastern end of the Ljósavatn lake, passing westward through Ljósavatnsskarð on the south side of the lake. All this stretch is on the whole fairly even and neither snow nor ice is considered very dangerous to the line here. At the south-eastern end of Ljósavatn (lake) - about the farm Vatnsendi - southerly winds are said to be very strong with violent gusts (especially during late-summer) and the force of the wind is probably nowhere else greater along the whole trace.

West of Ljósavatnsskarð is the Fnjóskadalur valley and west of that again is the Vaðlaheiði mountain range. It stretches from north to south between Fnjóskadalur and Eyjafjörður.

The transmission line passes straight across Fnjóskadalur, just north of the main-road. The altitude of this valley there is about 100 m above sea level.

Vaðlaheiði is a fairly high and broad mountain range, in most places 500 - 600 m above sea level; but the Fnjóská river cuts through the mountain range and empties into the Eyjafjörður on the eastern side about 24 km from its bottom.

The main road crosses the heath (= Vaðlaheiði) about 10 km north of the bottom of Eyjafjörður, at a point called Steinsskarð (pass), where the altitude of the heath is 520 - 540 m above sea level, while Geldingsárskarð is about 3 km farther south, having an altitude of some 600 m. Formerly the high road passed through there across the Vaðlaheiði but now there is only the state telegraph there.

The transmission line crosses Vaðlaheiði by Steinsskarð just a little north of the high road.

There is a great deal of snow on the heath (during winter) and the danger of ice is considered very great. It is for example said that the telegraph line on the heath has sometimes been covered with a 15 cm thick layer of ice (diameter). Northerly snowstorms stricking straight across the line are not uncommon there in winter time.

Owing to danger of ice the transmission line across the heaths must be made stronger than in the low-lands. The distance between the poles must not exceed 70 m on the heaths while in the low lands it is

90 m, and the copper wires must not be tightened to such a degree as to make their tension with normal extra load exceed 8 kg/mm^2 on the heaths and 12 kg/mm^2 in the low lands.

West of Vaðlaheiði comes Eyjafjörður, It is narrow and shallow at the head, but elsewhere it is deep. Its flood plains are dry at low water, but beyond them comes a grass-grown plain (Hólmarnir = delta), which is cut through by branches of the Eyjafjarðará river.

Akureyri is situated on the western side of Eyjafjörður and a little to the north of its bottom.

Scarcely two km south of the township the high road swings towards the east across the Eyjafjarðará and the delta, and then to the north on the eastern side of the firth and up the Vaðlaheiði-slope to Steinsskarð.

From Steinsskarð the transmission line proceeds midway down the western slope and inwards along it, mostly parallel to the road, till it strikes westwards across the Eyjafjarðará delta a little to the north of the high road, whence it proceeds along the western side of the firth above Akureyri, where it terminates in the Transformer station, scarcely a km above the main part of the town.

On the western slope of the Vaðlaheiði, and at the bottom of the firth the trace is on the whole fairly good.

b. The Trace.

For 30 km from its terminals from the Laxá power station the line proceeds straight south at about right angles to the station wall. There in the gorge is an angle pole marked angle pole "0". Thence the line is stretched in one span across the river to a pole on the western brink of the gorge. The span is about 80 m.

From the pole on the brink of the gorge the line now proceeds about 15 m south of the fixed point "N" (see plan 2) in a straight or almost straight direction to angle pole II south-east of Grenjaðarstaðir. Thus the line passes just a little south of the point which in the plan is marked angle pole I.

Scarcely 30 m west of the river the line crosses the road into Laxárdalur. At angle pole II the line swerves a little to the left and, passing Kraunastaðir on the north side, proceeds to angle pole III, which is situated between Kraunastaðir and Múli. Then again it swerves a little to the left, proceeding westward south of the farm Múli to angle pole IV, which is some 400 m farther west.

On the stretch between angle pole II and angle pole IV (about

2000 m) the line must be made with increased safety. At angle pole IV the line turns once more a little to the left and then passes southward along the base of Múlaheiði to angle pole V almost due east of Vestmanns lake at the northern extremety of Vatnshlíð.

At angle pole V the line again sways just a little to the left, passing southward along Vaðlaheiði to angle pole VI on the breast of the Vatnshlíð, northeast of the mouth of Reykjadalsá. There the line turns a little to the right, and, crossing Reykjadalsá in three places, passes Helgastaðir on the east to angle pole VII, some 0,5 km south of Helgastaðir.

At angle pole VII the line swerves a little to the right, crossing the high road and the state telegraph at a distance of 0,5 km and 1,0 km respectively from the angle pole. Then it proceeds in a straight line just north of Hamrar across Fljótsheiði about 400 - 1000 m north of the high road to angle pole VIII, just east of Skjálfandafljót. Across Fljótsheiði the line lies at 300 m above the level of the sea, at most.

At angle pole VIII the line swerves to the right and crosses Skjálfandafljót a little below the point where its Kvísl (the branch) joins it, the span being 110 m. Almost due south of Hrifla the line crosses the state telegraph, and south-west of Holtakot the private line to that farm, and a little farther west, the high road as well. (The position of Holtakot is inaccurately marked on the Ordnance map). The line now proceeds in a straight line from angle pole VIII to angle pole XII (NB. angle pole XII comes next after angle pole VIII), which is situated 1,5 km north of the farm Ljósavatn. There the line turns a little to the right and passes westward, with the farm Vatnsendi on the south, to angle pole XIII, scarcely 0,5 km north-west of the farm. On its way the line crosses the road leading south into the western part of Bárðardalur.

At angle pole XIII the line turns to the right and passes westward with Ljósavatn to the north to angle pole XIV which is some 800 m south-east of Arnarstapi. There it again swerves to the right and passes north-west along the Ljósavatn lake below Arnarstapi to angle pole XV, some 0,5 km east of Stórutjarnir.

At angle pole XV the line turns to the left continuing westward through Ljósavatnsskarð, north of Stórutjarnir and Háls to angle pole XVI at a distance of some 1300 m north-west of Háls. Just west of angle pole XV it crosses the telephone line to Litlutjarnir.

North of Kambsstaðir the line crosses Kambsá, which there flows over broad gravel bars, where a pole must be put up in the river.

East of Háls the state telegraph twice crosses the trace at angles of 18° and 12°, the distance between the crossings being some 1400 m. The state telegraph line will have to be shifted southward sufficiently far from the transmission line.

Just north of Háls the line crosses the high road leading to the east, and some little distance farther west, also the road leading north along Fnjóskadalur.

At angle pole XVI the line turns to the left in a westerly direction to Steinsskarð on Vaðlaheiði, and then continues in that direction till it reaches the western slope of the heath (Vaðlaheiði) about 0,5 km below its western edge, and comes to angle pole XVII.

Some 0,5 km west of angle pole XVI the line crosses Fnjóská north-east of the farm Nes, the span amounting to some 100 m. On the western bank of the river the transmission line crosses at one span the telegraph line and the car road into Fnjóskadalur.

On the eastern slope of Vaðlaheiði the line usually lies about 0,5 km to the north of the bends in the road; but on reaching the highest point of the Skarð (pass), it passes along just north of the road at an altitude of about 540 m above sea level.

At angle pole XVII the line swerves to the left and then proceeds south-westward to angle pole XVIII, just below the lowest bend in the high road. Immediately north of angle pole XVIII the line crosses the road branching off from the high road and leading to Svalbarðseyri.

At angle pole XVIII the line turns to the left and then proceeds southward just below the high road to angle pole XIX, which is situated some little distance north and above Meyjarhóll. There the line turns to the east and continues in that direction to angle pole XX, which is a little to the south of Eyrarland. Immediately north of Veigastaðir the line crosses the high road, and above Varðgjá it crosses the state telegraph line at an angle of 14°.

At angle pole XX the line turns to the right west across the Eyjafjarðará delta, a little to the north of the high road, to angle pole XXI, about 600 m north-east of Kjarni. South of Eyrarland the line crosses the state telegraph line and a little farther to the west, the high road leading east.

At the cross-ways where the high road leading eastward branches off from the road leading into Eyjafjörður, the line crosses the high

road and the telegraph line at one span, and about 440 m west of that the high tension line to the Kristnes Sanatorium, about 15 m east of angle pole XXI. There the line turns to the right, proceeding north-westward for about 800 m to angle pole XXII, where it again turns to the right. heading almost due north about one km above the main part of Akureyri, till it reaches the road leading from Akureyri to the upper Glerár-bridge (Thingvallastræti). There the line terminates in the main transformer station of Akureyri, about 0,5 km below Lundur.

From angle pole XXII to the Akureyri main transformer station the line must be constructed with increased safety.

NB. It should be mentioned that the angle poles are numbered in such a way that angle poles IX - XI are dropped. The angle poles are therefore three less than the number implies.

c. Description of Soil.

Distances are calculated in metres from angle pole marked No.1 on the edge of the gorge.

Angle pole I is in 0.

0 - 1340 dry moors.

1340 - 1520 homefield newly cultivated.

1520 - 1870 moors.

Angle pole II is at 1612.

1870 - 2240 Kraunastaðir homefield.

2240 - 2500 moors.

2500 - 3100 the Múli farms' homefields.

Angle pole III is at 2529

3100 - 3300 moors.

3300 - 3500 newly cultivated homefield.

3500 - 3750 lava (fairly solid) tolerably good line trace.

Angle pole IV is at 3604.

3750 - 5100 large hummocks, height up to 70 - 90 cm.

5100 - 5700 marshy ground.

5700 - 6850 dry moors.

Angle pole V at 6281.

6850 - 7160 wooded ridges with fairly deep gorges between in places sharply sloping at right angles to the line.

Angle pole VI is at 6923.

7160 - 7800 grassy mounds with marshy stretches between. (Reykjadal's river crossed).

7800 - 9200 the Helgastaðir meadow, marshy stretches in places. (Reykjadal's river twice crossed).

9200 - 10600 dry moors.
Angle pole VII is at 9470.

10600 Fljótsheiði begins.

10600 - 11250 a steep slope up Fljótsheiði, hillocks and gravel plains.

11250 - 12000 dry moors.

12000 - 13000 marshes, very wet in places.

13000 - 18350 mostly dry moors, in some places wind-carved, with short marshy stretches here and there.

18350 - 18900 Ingjaldsstaðir meadow, swampy.
Angle pole VIII at 18811.

18900 - 19000 strip of lava on the eastern bank of Skjálfandafljót.

19000 - 19100 Skjálfandafljót.

19100 - 20400 lava with vegetation and sandy stretches between. In many places the lava must be cleared away and perhaps minor blastings done before the poles can be fixed.

20400 - 20850 moors, and lava, probably not far below the surface.

20850 - 21100 marshes.

21100 - 21300 Holtakot's homefield.

21300 - 22600 lava with vegetation, and lava stones sticking out of the soil here and there.
Angle pole XII at 22600.

22600 - 23600 dry moors.

23600 - 24400 plains, hard ground.

24400 - 25200 gravel banks and stony eminences with grassy hollows between.
Angle pole XIII is at 24715.

25200 - 26200 moors with swampy stretches between.
Angle pole XIV is at 25716.

26200 - 27300 gravel banks with deep gorges between, in many places sloping steeply down to Ljósavatn (at right angles with the line).

27300 - 28400 rocky ridges with gorges between.
Angle pole XV is at 27740.

28400 - 28600 the Stórutjarnir homefield.

28600 - 29700 stony hills and gravel plains, low places swampy.

29700 - 30400 swamps.

30400 - 30540 Kamb's river, gravel banks.

30540 - 30900 grassy plains.

30900 - 32100 dry moors.

32100 - 32600 swamps.

32600 - 33100 hard ground.

33100 - 35500 moors, mostly dry, brushwood in a few places.

35500 - 35800 the Háls homefield.

35800 - 36000 gravel banks.

36000 - 37000 moors and wind-carved ridges.
Angle pole XVI is at 36692.

37000 - 37600 gravel plains.

37600 - 38000 a slope down to Fnjóská, gravel banks and plains.

38000 - 38050 Fnjóská.

38050 - 45400 across Vaðlaheiði the soil is all over fairly uniform: stony eminences, moors, wet in hollows and gorges; stony in many places.
Angle pole XVII is at 43354.
Angle pole XVIII is at 44687.

45400 - 49100 mostly marshy, but sprinkled with dry hummocks of small size.
Angle pole XIX is at 48215.

49100 - 49200 flat rock or very scanty soil.

49200 - 49900 marshy land.

49900 - 53200 moors and stony and gravelly banks.

53200 - 53500 Eyrarland's newly cultivated homefield.

53500 - 54100 moors and a slope down to the delta.
Angle pole XX is at 53709.

54100 - 56300 the delta, branches of Eyjafjarðará. Between these branches the land is in many places rather wet but yet a tolerably good trace.

56300 - 56500 a slope west of the high road, gravel plains and eminences.
Angle pole XXI is at 56654.

56500 - 57000 newly cultivated land.

57000 - to the end (60190) moors and homefields alternately. The land is intersected by countless ditches and fences.
Angle pole XXII is at 57467.
End pole is at 60193.

d. Structure of the Line.

The operation voltage of the line is 30 kV. It shall be made of

many-stranded copper-wire of 3 x 50 mm^2 thickness. Its breaking stress must be at least 40 kg/mm^2. Specific resistance is 0,0175 $ohm/mm^2/m$ at 15° temperature C.

The slack of the line shall be fixed in such a way, that the maximum tension of the copper wire in the low-lands does not exceed 12 kg/mm^2 at - 5° C plus normal extra load. This shall be calculated as follows:

$200 \sqrt{d}$ in grammes for every meter of the lines.

d = diameter of the line in mm.

On the mountains the slack must be so great that the tension of the copper wire does not exceed 8 kg/mm^2 at - 5° C plus the above-mentioned extra load.

The minimum height above ground of a loaded wire must not be less than 6 m in an open field, and not less than 7 m where it crosses car roads. The distance between the wires in the case of delta-arrangement must not be less than 1,5 m. If all the wires lie in the same horizontal plan the distance between then may be less, yet never so small that the security against the lines touching becomes less than in the case of delta-arrangement being used with a distance of 1,5 m between the wires.

The wires shall be fixed to pin-type insulators. For fixings copper wire or appropriate clamps shall be used. The fixings must be made in such a way as to exclude the possibility of the wires being chafed inthem or the fixings cutting into the wires. Where the direction of the wires changes at the insulators, care must be taken to fix the wires in such a way as not to expose the fixings to stretching tension.

The poles are of straight-grown pine felled in winter, and impregnated with creosote according to the Rüping method (at least 90 kg/m^3).

In the low-lands, or where the danger of ice is not considered very great, the distance between every two poles shall generally be about 90 m. But where conditions require it, occasional distances may be longer, or up to 110 metres, but on the whole stretch from one tension mast to the other the average distance between every two poles must not, however, exceed 90 m.

On the mountain ranges, however, the distance between the poles must not exceed 70 m. Mountains, in this connexion, shall be considered

Fljótsheiði, from the corner of the homefield of the farm Hamrar

to Skjálfandafljót (angle pole VIII) and Vaðlaheiði from Fnjóská till the line turns in along the Eyjafjörður on the western slope of the heath.

Suspension poles are made of single trunks or poles. Their diameter at top must not be less than 18 cm in the lowlands and 20 cm on the mountain ranges, - the diameter to increase by at least 0,7 cm for every meter of the pole.

Tension poles shall be set up where special reasons seem to require it, as e.g. on the edges of heaths and wherever the direction of the line in the vertical plan undergoes any great change.

In other respects the tension poles must be so many that the number of suspension poles between every two tension poles shall on an average not exceed 14. Angle poles and crossing poles shall be considered tension poles, if they comply with the stipulations required.

Tension poles shall be supported in the direction of the line. Double poles, and not stays, must be used.

For angle poles double poles, not stays, must be used.

Crossing poles shall be supported on both sides of the crossing span in the direction of the line, and, on one side at least, at right angles to the line. Here double poles, not stays, shall be used.

All the poles shall be safely fixed in the ground, so as to prevent their falling to the ground or slanting. At least 1/6 of every pole shall be dug down and fixed with a sufficient quantity of stones. Where the soil is very loose as in bogs stones must be heaped up round the poles to make them as secure against tumbling down as the poles are elsewhere on the line.

All poles must be fitted with caps and caution boards and be numbered.

The crossings of the transmission line over roads and other electrical lines shall be made with increased safety construction; nor must the crossing spans exceed 35 m unless the position is such that a better crossing is obtained by a larger span. Yet these spans must never exceed 50 m. Wires on both sides of the crossing span shall be fixed to two insulators similar to those used elsewhere on the line, or to one insulator for at least 45 kV normal voltage. Insulators and fixings shall be able to stand at least 90% of the breaking tension of the wires.

Crossbars, insulator pins and other metal parts of the crossing

poles shall be earth-connected.

Crossings of the transmission lines and telegraph lines shall be effected by laying the telegraph line underground at the place of crossing. This must be done in concert with the telegraph authorities of Iceland.

The crossings, in so far as not described here, shall be made according to the regulations in force.

In three places on the transmission line there shall be circuit-breakers to divide the line into four parts. One of the circuit-breaker poles shall be situated just east of Vaðlaheiði (near the farm Nes); the second near Skjálfandafljót on the western side (in the neighbourhood of Holtakot), and the third just east of Fljótsheiði. These poles shall be double poles.

If tension poles and angle poles are fitted with pin-type insulators, the wires must be fixed to two insulators of the same kind as are used elsewhere on the line, or to one insulator for at least 45 kV normal voltage.

The wires must be so securely fixed as to exclude the possibility of their sliding. Insulators and fittings shall be able to stand at least 90% of the breaking tension of the wires.

Where the line is constructed with increased safety, the wires must also be fixed to two insulators of the kind used elsewhere on the line, or else to insulators made for at least 45 kV normal voltage. In so far as not expressly stated here, the line shall be constructed according to the regulations in force respecting the construction of lines with increased safety.

To prevent the transmission line from disturbing telegraph lines, the wires of the transmission line must revolve in their fixings. In case of delta-arrangement the wires must revolve once, but if all the wires are in the same horizontal plan it must revolve twice.

In so far as not expressly stated in the foregoing, the line shall be constructed according to the regulations in force respecting overhead transmission lines.

But so far as it does not clash with the Icelandic regulations and this description, German, Swedish, Norwegian or Danish regulations may be followed.

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Before the work is contracted for, the Akureyri town has a profile made of the transmission line trace according to the surveys that have

been made. According to the profile the pole places will later be fixed, as well as the length of the poles and their thickness and an exact pole-list made out. All the poles will be numbered. The poles shall be made according to this list, dressed and bored as may be required, so that on the trace nothing need be done except screwing the beams together in the case of double poles, and fastening the fittings to the poles.

C. MAIN TRANSFORMER STATION AT AKUREYRI.

a. General Remarks.

From the power station on Laxá to Akureyri the energy is transmitted by 30 kV voltage. The main transformer station at Akureyri is to transform the energy from 30 kV down to 6 kV and at this voltage it is transmitted through the town to the town transformer stations. The transformer house will be built of concrete and will be situated at Thingvallastræti, some 1200 m from the sea. The high-tension line from Laxá enters the transformer house as an overhead line, but a room is left for a 30 kV terminal while the 6 kV system goes out in underground cables.

b. Transformers.

The station has one transformer for 30/6 kV, 1700 kVA of core-type, oil-insulated and air-cooled and made for parallel operation. It must be filled with oil and equipped with an oil-pump and an oil-tank. Meters must show the temperature of the oil. The transformer shall be equipped with Buchholz-relay and furnished with necessary spare parts.

The efficiency of the transformer shall be stated at 1/4 - 1/1 load at cos. φ = 1 and cos. φ = 0,8 and its no-load loss as well. The transformer house is also intended to have room for two other transformers.

c. Switchgears, Meters and Signal Apparatus.

The system of connections of the transformer station is shown on plan L-370606 A.

To the end of high-tension overhead line from Laxá, and where it enters the transformer station there are fixed an excess voltage valve and a throw-over switch for earth-connexion. Then the line enters the station through a wall insulator and through a bus-switch, and an oil circuit-breaker and a bus-switch it reaches the 30 kV bus-bars. The transformer is connected with the 30 kV bus-bars through a bus-switch, and an oil circuit-breaker. From the secondary side of the transformer there lie underground cables to 6 kV oil circuit-breaker and then through a bus-switch to 6 kV bus-bars. From the 6 kV bus-bars the 6 kV systems pass as underground cables out of the station through bus-switches, oil circuit-breakers, current transformers and bus-switches.

Both the 30 kV and 6 kV bus-bars will at first be single, but later

on it is intended to fix up other bus-bars, and therefore frames and walls for them and corresponding bus-switches shall be built from the first (shown with broken lines on pl.).

The transformer for voltage measure is connected with the 30 kV bus-bars through bus-switches and fuses. Voltmeters shall be furnished to measure the voltage between all phases, and also a meter with a throw-over switch to measure the voltage between all phases and the earth.

From the 30 kV bus-bars there will later be taken an out-going overhead line. Therefore the necessary walls and frames for the apparatus to be put up there later shall be built from the start (shown on plan with broken lines). In the 6 kV bus-bars there are current transformers and in connexion with them amper-meters in all phases, a kwhr-meter and a registering watt-meter for unequally loaded phases. To the bus-bars are also fixed measuring transformers with volt-meters to measure the voltage between all phases and to the earth, in the same manner as for the 30 kV bus-bars. The transformers are fixed to the bus-bars through bus-switches and fuses.

There will at first be only one 6 kV out-going line, but as it is intended to have room for other two, there must on first development be put up the frames and walls required. The out-going 6 kV lines are equipped with amper-meters in all phases and watt-meters for unequally loaded phases.

And further, complete apparatus of the proper size to clean the oil transformers. This apparatus shall be so made as to be easily carriageable between the stations.

II. TENDERS INVITED.

The Akureyri town council invites tenders for:

1) machines, apparatus and other material for a power station on Laxá which issues from Mývatn, a transmission line from Laxá to Akureyri, and a main transformer station at Akureyri (1. chapter of tender),
2) transportation of all machines, apparatus, material to the places where those things are to be used, whether in the power station, on the transmission line trace or in the transformer station at Akureyri (2. chapter of tender),
3) erection of machines and apparatus in the power house, the main transformer station at Akureyri and the construction of the transmission line (3.chapter of tender),

as will be enumerated in greater detail below, in chapters 1., 2., and 3., and also according to foregoing descriptions, accompanying plans, and the terms on which tenders are invited, to be described below.

Chapter 1. MACHINES AND MATERIAL.

A. Power station.

a. Hydraulic Equipment and Turbines.

1. Gates, Rack, and Intake Pipes.

Two wooden gates with iron guiding frames for the intake partitions of the penstock (see description A.b.1). The eastern gate shall be equipped with electrically worked lifting gear and a reserve gear (for the same purpose) worked by hand-power.

One bottom gate with a guiding frame and hand-power worked lifting gear.

One rack for the eastern intake partition.

Two intake pipes of 3,6 m length with a diameter of 2400 mm to be cemented into the rear wall of the intake partition and connected with the wooden pipe to be mentioned below.

Joints between intake pipe and wood-stave pipe.

2. Penstock.

Material for an iron-banded wood-stave pipe, 690 m long with a diameter of 2400 mm (see A.b.2 and pls.by Á.P., 1 and 3).

3. Distributing Tube.

A distributing tube to connect the penstock to the pipe fittings of the turbine (see description A.b.3).

4. Turbine.

One 2000 H.P. Francis turbine with 500 revolutions a minute, for a gross head of 37,5 m (see description A.b.4) furnished with a water valve, pipe fixings etc.

b. Eledtric Machines, Transformers and Switchgears.

1. Alternators.

One 3-phase alternator, 6000 volt, 1800 kVA, 500 rev/min, 50 cycles per sec. with an exciter connected on the same shaft, and all accessories, as described under A.c.1.

2. Transformers.

One oil-cooled 3-phase transformer for 1800 kVA, 6000/30000 volt, 50 cycles/sec., and one 3-phase transformer for 100 kVA, 30000/220 volt, 50 cycles/sec., according to description A.c.2.

3. Switchgears, Meters and Signal Apparatus.

All switchgears, meters, signal apparatus and relays for the 6 kV and 220 volt systems, together with frames, armature irons, indoor cables, wires (except lighting installation in the power house), underground cables for a motor and fittings for intake gate, earth connexions, excess voltage valves and a terminal for a high-tension line, with all the necessary accessories and spare parts. Hereinunder are included a direct rectifier, an electric battery and the whole 110 volt diesel current system (except installation for reserve lighting). All according to description A.c.3.

c. Transportation Facilities in Power House and Workshop.

1. Travelling Crane.

One 25 ton travelling crane in machine room with rails, motors, and fittings and one 15 ton crane in workshop, with rails, motors, and fittings, according to description A.d.1.

2. A Truck for Transformers.

One 15 ton truck to move transformers inside the power house, with rails, according to description A.d.2.

B. Transmission Line to Akureyri.

All material for a transmission line from Laxá to Akureyri, built for a voltage of 30 kV by 3 x 50 mm^2 to be suspended on single poles of impregnated timber, according to description B (a - d), as copper wire for wires, all suspension poles, end poles, angle poles, crossing poles, circuit-breaker poles, and revolving poles, all pole-fittings,

cross bars, insulators, circuit-breakers, caps, caution signals, numeration plates etc., equipment for increased safety construction, crossings, earth-connexions etc., and all other material of any description whatever, which is required to make the line safe and capable of working, according to the above description.

C. Main transformer Station at Akureyri.

1. Transformers.

One 3-phase oil-cooled transformer for 30/6 kV, 1700 kVA, 50 cycles/sec. (see description C.b.).

2. Switchgears, Meters and Signal Apparatus,

for the main transformer station at Akureyri, according to description C.c. and plan L-370606 A.

The tender shall comprise all switchgears, meters, signal apparatus and relays for 30 kV and 6 kV, all frames, armature irons, cables, wires, intake for 30 kV transmission line, excess voltage valves, earth-connexions, a terminal for a 6 kV cable, and all other material of whatever description required for completely erecting and connecting the transformer station (according to the above-mentioned description).

Furthermore an oil-cleaning apparatus.

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All the above-mentioned machines, gear and material, according to A - C, shall be offered cif. Akureyri or Húsavík. All material, machines and gear shall be of good quality and of finished workmanship and according to regulations in force. The tender shall comprise all material, large and small, necessary for the erection, construction and connection of all machines,gears, cables, pipes and lines, unless otherwise expressly stated, so that the plants can be brought to completion and put in full working order. Thus, for instance, the offer must comprise guide rods, tongs and so on, and a convenient gear for short-circuiting and earth-connexion, when work is being done in the high-tension room or on the line. All transformers shall be equipped with terminals, so that their voltage may be changed by 5% to 10%.

All electric machines and electric apparatus, gears, cables and lines must satisfy the demands required by the regulations in force, unless otherwise expressly stated. German, Swedish, Danish or Nerwegian regulations may be followed in so far as they do not clash with Icelandic regulations.

Chapter 2. UNLOADING, CUSTOMS DUTIES AND TRANSPORTATION FROM HARBOUR TO THE SITE OF WORKING.

Hereinunder are included expenses incurred in connexion with the above-mentioned material (machines, apparatus etc.) on the way from ship's side at Akureyri or Húsavík to the places of erection in power station, main transformer station at Akureyri and along the transmission line from Laxá to Akureyri. Thus are included all expenses of unloading, rent for storage or store-rooms down by the harbour as well as for transportation to these places. Also all customs duties and other disbursements to the state and municipalities; transportation from the harbour to the places where the material is to be used, whether at the power station on Laxá, the main transformer station at Akureyri or on the transmission line from Laxá to Akureyri. Every transmission line pole shall be transported to the place where it is to be put up, with all accessories (insulators, irons etc.) according to the list of poles, and a plan of the line, both of which are supplied by the buyer. The copper wire rolls shall be distributed along the trace at convenient places, to be decided on later.

Chapter 3. ERECTION, CONSTRUCTION AND CONNEXION.

Hereinunder is included all the work required for erecting, constructing and connecting the above-mentioned machines, apparatus, fixings, cables, wires in the power house and transformer station at Akureyri, with the exception of the foundations of the machines, excavations and cradles for the penstock, and excavations for cables to motors, of the intake gate from the power house to the dam.

Also all work in connexion with the construction of the transmission line, as the digging of holes for the poles, putting the poles together, raising and fixing them in the ground, putting on their fittings, stretching out the wires, and tightening and fastening them.

This includes all work required for erection, construction and connexion, till every part of the power plant, transformer station and transmission line is fully completed and ready for testing and operation. All expenses of tools are also included.

ADDITIONAL TENDERS.

Besides the chief tender as described in the foregoing pages additional tenders are desired for extensions and other arrangements of the development, consisting in the following few points:

1. Another 2000 H.P. machine unit, transformer, switchgear with accessories in power station, and another transformer in the main transformer station at Akureyri for 1700 kVA together with switchgear and all accessories, transportation and erection of these machines and apparatus in the manner described in the chief tender.

2. The penstock, so made that the gross head may later be raised to 44 m without the necessity of altering the penstock in any way, except adding iron-bands.

3. The distributing pipe, made in such a way that the later unit can be connected to it without a stoppage in the power station.

4. The turbine, made in such a way, that the gross head may later be raised to 44 m and the turbine retaining unchanged both speed and power. The expenses entailed by the alteration of the turbine then made necessary, should be stated as well as what this alteration consists in, and the efficiency of the machine before and after the alteration.

5. The transmission line, the change consisting in the distance between the poles being 55 m in the low-lands and 50 m on the mountains. The tension on the wires and the safety against the wires touching as in the chief tender and other conditions unaltered.

6. Automatic apparatus to put out fire in the alternators.

7. A handy instrument to institute water resistance for testing the machines.

8. The penstock, so made that the gross head can later be raised to 57 m without the penstock having to be altered, except as regards adding new iron-bands.

9. Machines and other apparatus made with a view to later raising the gross head to 57 m. The tenderer is desired to make suggestions of the arrangements he considers most advantageous. There would then be two alternatives:

a. The machine units might have the same power after the change and a new unit be connected with the same penstock to utilize it to the limits of its capacity, and

b. both units were at once made for 57 m gross head for a correspondingly greater normal load, but at first worked with 2000 H.P. at 37,5 m gross head.

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To the additional tenders the same stipulations apply as to the chief tender in so far as they are applicable.

III. TERMS ON WHICH TENDERS ARE INVITED.

1. The Time of Construction.

In his tender the builder must state the time he requires for constructing the whole plant as well as the various component parts thereof. Further he shall declare himself ready to guarantee, on pain of daily fines, the completion of the development in the time stipulated.

2. The Type of Machines, Material and Workmanship.

All machines, gear and material must be of the best kind and the work well executed. The fullest regard shall be paid to all the most recent advances made in the arrangement of the various parts of power stations and the distributing systems, and more especially to everything makes for increased reliability in the working of the plant. The builder must, moreover, mention the norms according to which each separate part of the contract is executed.

It is permissible to offer other kinds of machines, gears etc. than those mentioned in the description, and another arrangement of some parts of the development than there stated; but such offers must be accompanied by descriptions, setting for the particulars in which a deviation is made from the tender, and the reasons stated for this deviation.

3. Control.

The Akureyri Municipality reserves the right to engage experts to inspect the construction of machines and tools, during their manufacturing, erection, construction and execution of the work, to sanction the drawings.

The builder must comply with the decisions of the experts within the limits laid down in the description and contract.

4. Guarantee.

For twelve months after the development has been completed and thoroughly tested, the builder is responsible for all machines, tools, material, and workmanship, and any defects appearing during that period must be repaired by him at his own expense.

In the contract the owner may reserve the right to retain a certain amount of tender as a security, until the guarantee time elapses.

5. Tests.

On the completion of erection, connexion and other work relative

to the power station, distributing systems etc., machines and tools shall be subjected to a test to ascertain their functioning properly and complying with the stipulations made.

6. The Time within which Tenders must have come in.

All tenders are binding on tenderers till

They shall be sent to

before

The owners reserve the right to reject all the tenders, or to accept any one of them, as they see fit.

7. Contract.

On an offer having been accepted, a contract shall be made for the construction of the plant between the tenderer, as the builder, and the Akureyri Municipality, as the owner.

This contract must among other things contain provisions arranging the manner in which payments are to be made to the builder, as well as more precise statements: respecting the time within which the building of the plant is to be completed and the fines payable in case the terms of the contract are not complied with in this respect; it shall also comprise rules for the inspection of the work; the approbation of working-drawings; the security to be given by builder as being responsible for machines and plant; and provisions respecting the delivery of plant and distributing systems.

The contract shall also provide for the settlement of eventual points of disagreement which may arise between owner and builder.

Reykjavík, October, 1937.

JAKOB GÍSLASON (sign.)