C O N T R A C T

for the building and delivery of a submarine torpedo-boat for the Royal Danish Marine Ministry.

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Art. 1.

We undersigned Fiat San Giorgio Ltd. Society of Genoa (Italy), shipbuilders and engineers with ship yard in Spezia(Italy), undertake to build and deliver to the Danish Marine Ministry a submersible torpedo-boat in accordance with annexed drawing and specification.

The supply of the submersible torpedo-boat will comprise:

a) The complete hull, with all the fittings and accessories necessary for the practical use of the boat, whether mentioned or not in the present contract with enclosures.

b) The torpedo-tubes complete with all the fittings and everything necessary for their use according to drawings approved by the Danish Ministry of Marine.

c) The motors complete, fitted on board and ready to be used both for the surface and submerged navigation.

The provisions, stores and torpedoes are not comprised in the present contract.

Art. 2.

The contractors have to pay the Italian inland revenue stamps for this contract.

Art. 3.

When the building of the boat is commenced, every part belonging to the hull and machinery is to be considered as the property of the Danish Marine Ministry so as to form security for instalments paid.

If required by the Danish Marine Ministry further satis-

factory security is to be given for instalments paid.

Art. 4.

The contractors have at their cost to keep insured against fire, sea damage and other risks all parts belonging to the boat. The amount insured to be at least equal to the instalments paid. The insurance policies to be deposited with the Danish Marine Ministry.

Art. 5.

The Marine Ministry reserves itself the right of controlling the work by one or more inspectors. During the building of the boat the inspectors have to control that the drawings, specifications etc. are followed; they have also to control, that the materials used and the execution of the work in all respects is in accordance with the contract and corresponding to first class workmanship in the strictest sence of this word and according to the use of the different materials.

The contractors will have in every respect to facilitate the inspectors in the performance of their duties.

Art. 6.

The contractors undertake to make without extra charge such small departures from the drawings or specifications as found desirable during the execution of the work and which will be of mutual agreement. These departures to be requested by the inspector in such good time as not to cause the contractors any expenditure of importance.

The contractors are not entitled to extra charge for any work regarding the boat unless the Danish Marine Ministry before the execution of the work has approved, in writing, the amount of the extra charge.

The inspectors have the right to reject any piece belonging to the boat, which they find defective by ascertained bad quality of the material or workmanship, and the contractors will have at once to replace such piece with a new one.

Art. 7.

The contractors have during the first six months from the acceptance to substitute or repair all those parts, accumulator battery included, which has get out of order on account of ascertained bad quality of the material or workmanship.

From the above mentioned guarantees for boat and battery are excluded those damages which take place in consequence either of "forza maggiore" or through the using of the material not in strict accordance with good naval rules and by cause of natural wear and tear.

Art. 8.

The contractors will at their own expence have the submersible tugged as far as Copenhagen by the EM. Z. SVITZERS BJERGNINGS-ENTREPRISE of Copenhagen and on conditions approved by the Danish Marine Ministry. The final delivery takes place in Copenhagen after examination of the different parts to ascertain that they are in the same good condition as after the trials in Spezia.

The reception trials are to take place in Spezia and the boat has to be ready for trials latest 16 months from the date of approval of this contract by the Danish Marine Ministry.

If the boat is not ready for reception trials at this time, the contractors will have to pay a fine of 1500 Francs a week or part of a week, until the delivery takes place.

If however the delay is caused by strike, lockout, natural events or other cause for which the contractors are unaccountable the fine will not be demanded, if the contractors at once report, in writing, to the Danish representatives, when the stoppage occurs and give full proof for the cause of the same.

A Danish crew will at the cost of the Danish Marine Ministry assist at the transport of the boat from Spezia to Copenhagen.

Art. 9.

Together with the boat is to be delivered a complete set

of drawings on tracing cloth, also specifications of the different weights.

Art. 10.

The following reception trials are to be carried out in Spezia with the boat complete and equipped in the presence of representatives from the Danish Marine Ministry, viz:

A. Trials, when completely emerged.

1) A maximum speed trial of 1 hour's duration, during which the mean speed measured in two opposite directions on a measured base in calm weather is not to be less than 11 (eleven) knots.

2) A cruising speed trial at 7 knots speed to fix the radius of action, which must not be less than 75 nautical miles. The motors are kept working until the lowest agreed exhaustion of the battery has been reached.

B. Trials, when completely submerged.

1) A maximum speed trial of 1 hour's duration, during which the mean speed measured in two opposite directions on a measured base with the deck about three meters below the sea surface and in waters not less than twelve meters deep, is not to be less than 7 1/4 (seven and one quarter)knots per hour.

2) A cruising speed trial at 5 knots speed of 3 hours duration.

After the trial the consumption in amperes and volts has to be measured and the capacity of the battery at this rate of discharge is to be such, that it permits a duration of at least 12 hours, or 60 nautical miles.

During the submerged trials, in straight direction, the boat has to be kept practically horizontal and to remain within the limits of 0,50 m above and 0,50 m below the depth required.

C. Stability tests.

The stability has to be measured by transverse inclination of the boat completely emerged.

Without the lead ballast, and the water tanks completely empty, the boat is to have still a positive metacentric height to be proved by calculations from the stability completely emerged.

D. Solidity and watertightness tests.

The boat has to be immersed with her keel to a depth of 40 meters, as well with the water tanks completely filled and in direct communication with the sea, as with the water tanks only partially filled. The crew to be on board if desired by the Danish representatives.

There has to be no leakage at this depth and no permanent deformation after the test.

E. Submersion trial.

When the boat is running on the surface at cruising speed of 7 knots at lightest draught the submersion has to be obtained within 5 minutes. This time is calculated from the moment the order is given, until the moment when only the optical apparatus is above water.

F. Emersion trial.

The boat being submerged at the normal depth (3 meters of water above its deck) is to be in three minutes brought back to the position of surface navigation, running at her cruising speed (7 knots) with all the water tanks empty.

G. Torpedo-launching trials.

The torpedo apparatus is to be tried by firing torpedoes as well with the boat at rest as in motion, and as well on the surface as submerged.

While firing the torpedoes the boat has to keep her depth and her horizontal position practically unaltered.

H. Other trials.

Other trials such as steering and turning of the boat, the manoeuvering of the motors and pumps, the filling and emptying of ballast tanks, working of winches, ventilators, elec-

tric light, capacity of accumulator battery, etc. are to be undertaken.

Art. 11.

On the above named trials everything is to work to the entire satisfaction of the representatives of the Danish Marine Ministry and in accordance with the present contract.

The contractors will receive an autentical copy of all the documents relating to the observations and trials made by the Danish representatives and will have the right to have included in the above mentioned documents their own observations.

The statement that the submersible is in accordance with the contract will be given in Spezia by the Danish representatives.

Art. 12.

The contractors will receive from the Danish Marine Ministry the necessary informations regarding the torpedoes within three weeks after the signing of this contract.

Torpedoes for the torpedo launching trials to be sent out at the care and charge of the Danish Marine Ministry upon the request of the contractors.

Art. 13.

If during the trials specified in Art. 10 A. 1. with the boat completely emerged, the boat does not reach a speed of 11 knots, the contractors will have to pay a fine of 2000 Francs (two thousand Francs) for each tenth (1/10) of a knot to a minimum speed of 10 knots, which is the lowest limit for the acceptance of the boat.

If during the trial specified in Art. 10 B. 1, with the boat completely submerged, the boat does not reach a speed of 7 1/4 knots, the contractors will have to pay a fine of 2500 Francs (two thousand five hundred Francs) for each tenth(1/10) of a knot to a minimum speed of 6 1/4 knots which is the lowest limit for the acceptance of the boat.

If during the trial specified in Art. 10 A. 2. the boat does not reach a radius of action of 75 nautical miles at a speed of seven knots, the contractors will have to pay a fine of 1000 Francs (one thousand Francs) for each mile below 75 till a minimum of 70 miles, which is the lowest limit for the acceptance of the boat.

If the boat as a result of the reception trials or the inspection is found not to satisfy the conditions specified in this contract with annexed drawing and specification but with the above mentioned limitations, the Danish Marine Ministry has the right to reject the boat and the contractors will have to return all instalments previously paid with a commercial annual interest of 5 % (five per cent).

The Danish Marine Ministry however reserves itself the right to accept the boat with the defects found, but the price has then to be reduced according to circumstances and further agreement with the contractors.

Art. 14.

The Danish Marine Ministry will pay the contractors in Genoa (4. Via Balbi) an amount of 634.800 Francs (Italian money) for the submersible torpedo-boat specified in this contract, delivered in Copenhagen.

The payment will be disbursed in the following 6 instalments:

2/10 on the approval of this contract by the Danish Marine Ministry	Francs	126.960.
2/10 when all the materials for the hull have been brought into the Fiat San Giorgio ship yard in Spezia	"	126.960.
2/10 after the launching of the boat	"	126.960.
2/10 after the statement of the Danish representatives in Spezia mentioned in Art. 11.....	"	126.960.
1/10 after the delivery of the boat in Copenhagen	"	63.480.
1/10 after the elapse of the guarantee for the boat and the electric battery ..	"	63.480.

Art. 15.

During the construction and trials of the submersible torpedo-boat admittance to the boat for people, who do not belong to the Fiat San Giorgio firm, is only allowed with the permission of the Danish representatives.

Art. 16.

In case of any difference of opinion between the Danish Marine Ministry and the contractors about the interpretation of this contract with specification or regarding the results ofthe reception trials or the inspection and the fulfilment of the contract on the whole, the question will be submitted to the final judgement of a board of arbitration composed of three members, one chosen by the Danish Marine Ministry, one by the contractors and the third by these two members.

If an agreement between the two members for selecting the third cannot be made, the third member will be selected by the Danish Minister in Rome.

The judgement of the board shall be decisive.

Art. 17.

This contract is written in two copies of which one is kept in the Danish Marine Ministry and one by the contractors.

Copenhagen, April the 14th. 1908.

Subject to the approval of the Danish Marine Ministry:

(sign.) I. C. Tuxen. p.p.Fiat San Giorgio.

G. Boselli.

Til Vitterlighed:

(sign.) A. H. Rasmussen. O. Aarestrup.

SPECIFICATION.

GENERAL DESCRIPTION

of an electric submersible torpedo-boat of 132 tons.

System Fiat San Giorgio.

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Principal dimensions.

Length over all	34,65 m
Beam	3,35 "
Maximum draft below the keel, when fully emerged	2,20 "
Displacement when fully emerged	103 tons.
" " " submerged	128/130 "
Height of the deck when emerged	1,00 m
" " " hatchways when emerged	(1,20 " (1,50 "
Real metacentric height when emerged	0,40 "
" " " when fully submerged	0,20 "
Watertight compartments	6.

Diving.

Capacity of water ballast tanks	ca.25 tons.
Greatest diving depth	40 m
Time required to pass from complete buoyancy to complete submersion	5 min.
Time required to pass from complete submersion to complete buoyancy	3 "
Reserve of compressed air	1,300 m^3

Armament.

2 torpedo-tubes in the bow for 45 cm Whitehead torpedoes of 5,2 m length.

Speed and radius of action.

Maximum surface speed not less than	11 knots.
Radius of action in surface navigation at 11 knots speed	18,5) nautical
" " " " " " 7 " "	75) miles.
Maximum submerged speed	7¼ knots.
Radius of action in submerged navigation at 7¼ knots speed:	12) nautical
" " " " " " 5 " "	:60) miles.

Hull.

a. Materials and workmanship. All the materials of the hull, the fittings and the auxiliary apparatus to be of the very best quality.

All the materials of the hull to be of high tensile steel and to satisfy the following conditions:

Tensile breaking strength not less than 51 kg pr. mm^2.

Elongation not less than 18 % on bars of 200 mm of gauge length.

All the parts of the hull, of the motors, of the battery, of the auxiliary engines, fittings and accessories to be of first class workmanship.

b. Strength. The hull to be able to resist the pressure of a column of water 40 meters high.

c. Construction. The hull to be constructed according to the patented Fiat San Giorgio system with not circular sections.

Waterballast.

The waterballast comprises a system of tanks and cofferdams.

The tanks are to have a total capacity of ca. 25 tons and are to be able to resist the pressure of a column of water 40 m high.

The tanks can be emptied by:

a) compressed air

b) 1 centrifugal pump

c) 2 handpumps.

The compressed air to be stored in tubular steel accumulators hydraulically tested at 250 kg/cm^2, their usual working pressure being 150 kg/cm^2. Specially constructed safety valves to be fitted to the exhaust pipes of the water tanks, for preventing an excess of pressure in the same tanks.

The compressed air both for the above mentioned accumulators and for the torpedo service can be supplied direct from shore or by an air compressor of approved Whitehead type, able to give about 6 litres pr.minute at a pressure of 150 kg/cm^2.

The air compressor to be worked by one of the main motors.

All the air pipes distributers and fittings to be hydraulically tested at a pressure of 250 kg/cm^2.

One or more safety valves to be fitted on the hull for exhausting any excessive pressure of air which may accumulate in the interior of the boat through a leakage of compressed air accumulators.

The centrifugal pump to be driven by a main motor and to be able to expell 60 cubic meters of water pr. hour at the height of 40 m.

The two hand pumps to be able to empty the waterballast tanks at 40 meters depth.

The pumps are to be arranged in such a way that they may be used as ballast pumps for the different watertight compartments in the boat.

The cofferdams will always be full of water and in connection with the sea when the boat is submerged.

At surface navigations the cofferdams can be closed by special valves.

All parts of the hull, tanks and cofferdams to be accessible either directly or by hatches or manholes without dismounting riveted parts of the boat.

Compartments.

The interior of the boat to be divided into 6 watertight compartments.

Compartment N. 1 contains torpedo tubes, W. C., accumulators etc, N. 2 is central manoeuvering station, Nr. 3 is the motor compartment, N. 4 contains the air compressor and accumulators, N. 5 and 6 contain accumulators.

Hatchways.

The entrance to the boat to be through three hatchways.

The fore one will be used for taking down the torpedoes

and will be above the torpedo-room.

The central one forms part of the conning tower.

The after one is above the motor compartment.

Conning tower.

The conning tower, which is large enough to contain two men, to be of nickel amagnetic steel. In the conning tower is a steering station.

Propulsion.

The boat is to have two propellers with fixed blades, worked by two electric motors each of 95 E.H.P. from Siemens-Schuckert.

The electric power for working the electric motors is supplied by a battery of an approved Hagen type.

The accumulators to be set in boxes absolutely watertight.

The tension of the current to be invariably between 95 and 100 volts.

The variation of speed of the motors is assured exclusively by changing their field of induction.

Ventilation.

The boat to be ventilated by two ventilators.

The accumulator battery to be ventilated by a special arrangement, by which the gases developped during the charging of the accumulators, are conveyed directly outside the boat, without any access to the compartments themselves.

Steering and navigating.

For steering in the depth the boat is to have two pair of horizontal rudders, to be acted either in connection or each pair apart.

The depth to be measured by a depth gauge.

For steering in the horizontal direction the boat is to have one pair of vertical rudders to be acted from three different steering stations viz: one in the boat, one in the tower and one upon the bridge.

Each steering station to have a compass.

For indirect vision when submerged the boat is to be supplied with 2 "Cleptoscopes" of the "Russo-Laurenti" system.

One cleptoscope to be for panoramic vision and to have a total height of 5 meters and a conical real field of vision of about 50° giving the objects at their actual dimensions without alteration. This cleptoscope can be turned by an electric motor.

The second cleptoscope to be for monocular vision of about 30° field of vision but giving the objects with an elargement one by two.

Deck fittings.

The deck to be surrounded by a rail.

On the conning tower to be a bridge with a steering station

On the deck to be the necessary fittings for mooring and towing.

The boat to be supplied with one stockless anchor of about 150/200 kg weight with a total length of galvanized link chain of 75 metres.

The weighing of the anchor to be done by a hand winch.

On the upper part of the hull can be stored all the stores, such as hausers, oars, collapsible boat etc etc.

Inside accomodations.

In the central part of the boat are to be put the hooks for hammocks, the hammock netting without matresses and the drawers for the crews outfit. A W. C., a portable kitchen with all the fittings, a supply of about 300 dcm3 fresh water for the crew.

The captain will have a folding bed sopha, a chest of drawors and a writing folding table.

Safety appliances.

The boat to be supplied with a dropping lead keel weighing not less than 3 tons. The ballast to be rapidly detachable by

means of simple arrangements.

The boat to be supplied with hooks for hoisting in case of emergency and with other approved safety arrangements.

Torpedo-tubes.

The torpedo-tubes to be hydraulically tested at a pressure of 8 kg/cm^2.

The tubes are to have a length of 5,4 meters.

1 collapsible boat complete with fittings and Necessary accessories for working and navigating the submersible to be supplied.

S P A R E P A R T S.

Electric incandescent lamps	Nr.	60
Glasses for the conning tower	"	6
Exhaust pipes for the electric accumulators	"	30
Electric accumulators	"	15
Coupling tongues for electric accumulators	"	100
Insulators for accumulator plates	"	50
Glasses for insulating the accumulator boxes	"	100
Durite for the connections of the exhaust of accumulators	"	10
Coppered coal brushes for 30 mc^3 electrical extractors	"	10
Coppered coal brushes for 3 mc^3 electrical extractors	"	10
Manometer for the distribution of compressed air ..	"	1
Opaque glass for the cleptoscope	"	1.

AFSKRIFT.

Direktøren for Skibbygning og Maskinvæsen.

Orlogsværftet den 25'November 1908. Nr.2353.

Til

Aktieselskabet "Sophus Berendsen",

Gl. Torv Nr.24.

Premierløjtnant Aarestrup har indberettet fra Spezia, at Firmaet Fiat San Giorgio foreslaar, at der med Undervandsbaaden for det ene Cleptoscops Vedkommende leveres et af en anden Konstruktion end det, der er anført i Kontrakten, medens det andet Cleptoscop leveres uforandret.

Marineministeriet har bemyndiget mig til at meddele dets Sanktion paa Forandringen, der vil medføre, at sidste Del af det Afsnit i Specifikationen, der hedder "steering and navigating", kommer til at lyde som følger:

"One cleptoscope to be for monocular vision and to have a total height of 5 meters and a real field of vision of about 60°, giving the objects in their actual dimensions without alteration.

The second cleptoscope to be also for monocular vision with a field of vision of about 30° and giving the objects with an enlargement of one to two."

Dette beder jeg Dem meddele ovennævnte Firma, hvis Anerkendelse derefter imødeses.

(sign.) I. C. Tuxen.