33 ACTUATORS

33.1 GENERAL

33.1.1 Scope

1 This Part specifies the requirements for valve/penstock actuators.

2 For voltages and frequencies, regulations and requirements of Kahramaa and relevant authorities should be taken into account.

33.1.2 Description

1 Electric or penstock actuators shall be provided for valves and penstocks where specified.

33.1.3 Submissions

1 Submissions shall be in accordance with Part 1 of this Section and Part 7 of Section 1.

2 Shop Drawings submission shall include dimensional drawings of the actuator, including sections and elevations, showing the following:

(a) sizes and positions of components

(b) positions and method of fixing cable and boxes

(c) location of terminal boards

(d) wiring diagrams

(e) other pertinent data.

3 Project data submission shall contain the following:

(a) full specifications of the enclosure and the components of the equipment with relevant sheets of manufacturer's catalogues

(b) confirmation that the equipment complies with the relevant specifications.

(c) the torque-speed requirement calculations / data sheet done for this selection.

33.1.4 Standards (References)

BS 2757 Method of determining the thermal classification of electrical insulation. (EN 60085)

BS 5490 Specification for classification of degrees of protection provided by enclosures; (EN 60529 Degrees of protection provided by enclosures (IP Code))

BS 5501-1 Electrical apparatus for potentially explosive atmospheres; (IEC 60079 Explosive atmospheres)

EN 12570 Industrial Valves. Method for sizing the operating element.

EN 50018 Electrical apparatus for potentially explosive atmospheres. Flameproof enclosure 'd'; (IEC 60079-1 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d")

EN 60034-1	Rotating Electrical machines. Rating and performance.
EN 60947-7	Specification for low voltage switchgear and control gear. Ancillary equipment
ISO 5210	Industrial Valves. Multi turn valve actuator attachments.
ISO 5211	Industrial valves — Part-turn actuator attachments.

33.2 PRODUCTS

33.2.1 Electric Actuators

1 Where specified valves or penstocks shall be provided with electric motorised actuators.

2 As far as possible, the actuators shall be the standard product of a well known specialist manufacturer such as Rotork or Auma, which shall be approved by the Engineer.

3 Valve actuators shall be directly mounted onto and supported by the valves/penstocks which they control unless the valve/penstock is underground where the actuator shall be mounted at coping level. They shall be suitable for remote Automatic control and shall also incorporate means for local manual operation using a handwheel or lever. Actuators shall have integral starters and control equipment, unless the actuator motor is of a size that necessitates a panel mounted starter, in which case it will be specified in the particular specification.

4 The output shaft shall be hollow to accept a rising stem and incorporate thrust bearings of the ball or roller type.

5 The design shall permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service.

6 Valves stems and threads shall be provided with grease lubrication, rising spindle valves being protected with a totally enclosed grease packed cover tube.

7 The actuator shall be fitted with a drive bushing which is easily detachable for machining to suit the valve stem or gearbox input shaft. Bushing shall be fitted in the base of the actuator to enable standard length valve stems to be used.

8 Only two categories of sealing are permitted:

(a) UK BASEEFA certified for EExdIIBT4 CENELEC Norm EN 50018, BS 5501 for defined hazardous locations; or

(b) Watertight, dust-tight complying with the requirements of BS 5490 IP67 or better.

9 Actuators shall be suitable for pedestal mounting and interchangeable without removal of the associated valve, penstock, pedestal, etc.

10 Sealing of static joints shall be by 'O' ring on moving components to prevent leakage of lubricant from the machine.

11 The actuator shall provide Double Sealing between the terminal compartment and the internal electrical elements of the actuator, fully protecting the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when terminal cover is removed on site for cabling.

12 For control purposes limit switches shall be fitted to the actuator at both the closed and open positions of the valve. Limit switches shall also be fitted for signalling purposes. All these shall be fitted internally. Limit switches contacts shall be volt-free. The switch contact rating shall be 5 amps, 250 volts AC, 30 volts DC. Valve position shall be clearly marked externally on the actuator.

13 The actuators shall be sized so that they develop sufficient torque to reliably seat/unseat the valve or penstock off its seat, and to provide adequate torque throughout its operating range. The torque output must be at least 20% more than is required under maximum operating conditions (i.e. maximum differential head). The drive shall incorporate a lost motion hammer blow feature.

14 Adequate overload protection shall be provided to prevent actuator motor damage in the event of seizure. This shall either be in the form of torque switches, or over-temperature thermostats. The torque switch shall latch out on operation, and to be reset by driving in the opposite directions. A mechanical latch shall be provided to prevent the open torque switch tripping while the initial unsealing hammer blow is applied.

15 The setting of the torque and limit switches shall be able to be carried out without the need to remove any electrical compartment covers.

16 Adjustable mechanical limit stops shall be provided for open and closed positions of actuators.

17 Actuators supplies shall be 110 volts Single Phase or less for quarter-turn and 415V three phase for multi-turn. Motors shall have Class F insulation, with a time raring of 15 minutes or three times the open/close stroking time whichever is the longer. Motors shall be capable of operating at the sun radiation temperature and certification shall be provided to this effect. Nevertheless, sun/weather canopies shall be provided for all externally installed actuators. These shall give complete shading from the sun during the hottest part of the day and should not restrict maintenance or operational access.

18 Certain valve actuators will require fail safe operation in the event of an electricity mains failure. The Contractor may achieve this either by using fail-safe actuators, or by providing standby power supplies for the affected actuators. There should be no tendency for any actuator to "creep" either open or closed, both in normal operation or under mains failure conditions.

19 Anti-condensation heaters for use on 110 volt a.c. shall be provided for all actuator motors.

20 The actuator motor gearbox shall be of the totally enclosed oil bath lubricated type suitable for operation at any angle and provided with appropriate filling and drain plugs.

21 A hand wheel shall be provided for manual operation of the valve. This hand wheel shall not operate during powered actuator movement by reason of a positive means of disconnection from the motor driven mechanism. The wheel shall be maintained in its engaged position once this is selected until powered movement takes place when it shall automatically disconnect and "free wheel". The hand wheel gearing shall be selected to allow valve operation without undue effort i.e., not exceeding 25 kg.

22 It shall be possible to secure hand or powered operation by means of padlocking in the selected mode.

23 Where necessary to present the actuator hand wheel at a convenient operating height, flange mounted pillars shall be provided which fully enclose the necessary valve stem extension spindles. Supplementary support of the extension spindle within its pillar shall be provided for long shafts.

24 The open/close direction of rotation shall be clearly indicated on the hand wheel.

25 A visual position indicator shall be provided within the actuator complete with a pointer showing open/closed and in travel positions, and a sealed potentiometer to transmit continuous remote position. Where specified in the particular specification, this indicator shall be illuminated.

26 Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gear-case.

27 Modulating duty actuators shall be capable of 3000 operations per hour as a minimum.

28 The colour code for actuator push button shall be:

(a)	"Start" actuation	Green
(b)	"Stop" actuation	Red
(c)	"Re-set" actuation	Black
(d)	"Test" actuation	White
(e)	"Emergency Stop"	Red (mushroom style, latching on depressing, release on turning).

33.2.2 Pneumatic

1 Where specified valves/penstocks shall be provided with pneumatic actuators.

2 Air actuators shall only be used where specified in the particular specification and shall be of the double acting type and be field interchangeable without the necessity of removal of the valve or penstock.

3 Where a pneumatic actuator is used for modulating control it shall be fitted with integral feedback.

33.3 QUALITY CONTROL AND TEST PROCEDURES

33.3.1 General

1 The manufacturer shall provide proof of a stringent Quality Control (QC) Plan or Inspection Test Plan (ITP). In particular the main equipment manufacturing stages sanctioned by appropriate tests such as: incoming components inspection, discrete sub-assembly tests and complete functional checks on the final product. Equipment shall undergo on-load burn-in leaving the factory. Final inspection and calibration operations shall be documented in a report drawn up by the supplier's Quality Inspection department.

2 Combined operational lists shall be carried out at the valve/penstock manufacturers works and list certificates provided confirming limit switch and torque settings.

3 The integrated functional test shall be conducted at manufacturer's works to ensure satisfactorily functioning of the equipment.

4 The Assembly shall not leave the manufacturer's works until the works test sheets have been duly approved and stamped by the Engineer and written permission is obtained for their dispatch to site.

33.4 ENVIRONMENT

33.4.1 General

1 Environmental conditions shall be in accordance with Section 1 Part 1 unless specified herein.
2 Minimum ambient temperature shall be assumed as 0°C.
3 Sun radiation temperature shall be assumed as 70°C.
4 Maximum relative humidity shall be assumed as 95%.

END OF PART