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## TECHNICAL SPECIFICATION

Doc No : DSF-SPC-CIV-024

Rev. 1

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## HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

# RCC BUILDINGS

JUNE 2021

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## **1 SCOPE**

This specification covers the minimum requirements to be applied for the design and the construction of the R.C.C. building. The load bearing system of the building shall be Reinforced Concrete Structure, or alternative, Steel Frame Structure based on the Basic Design Description.

## **2 REFERENCES**

### **2.1 REFERENCES DOCUMENTS**

- Tech. Spec. No. DSF-SPC-CIV-001[Civil Design Loads]
- Tech. Spec. No. DSF-SPC-CIV-021[Buildings]
- Tech. Spec. No. DSF-SPC-CIV-006[Concrete Works]
- Tech. Spec. No. DSF-SPC-CIV-009[Structural Steel Works]
- Tech. Spec. No. DSF-SPC-CIV-010[Structural Steel Fabrication]
- Tech. Spec. No. DSF-SPC-MEC-006[External Painting]
- Tech. Spec. No. DSF-SPC-MEC-012[Fireproofing]
- Tech. Spec. No. DSF-SPC-CIV-003[Trenching and Excavation]
- Tech. Spec. No. DSF-SPC-CIV-005[Backfilling]
- Tech. Spec. No. DSF-SPC-ELE-005[General Electrical Works]
- STD-47-0-01[Typical RCC Building]

### **2.2 REFERENCE CODES AND STANDARDS**

- EU DIRECTIVE 305/2011 [Construction Products Directive]
- EU DIRECTIVE 92/42/EC [Boiler Efficiency Requirements for New Hot-Water Boilers Fired with Liquid or Gaseous Fuels Directive]
- Eurocode 3 [Design Steel Structures]
- Eurocode 1 [Actions on structures]
- ΕΑΚ-2003 ΦΕΚ 781B/18.06.2003 [Τροποποίηση και συμπλήρωση Ελληνικού Αντισεισμικού Κανονισμού ΕΑΚ 2000]
- ΦΕΚ 1154/B'/12-8-2003 Δ17α/115/9/ΦΝ275



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- EAK 2000[Hellenic Seismic Code]
- ΚΤΣ 2016[Greek Concrete Technology Regulation]
- ΦΕΚ 4007/Β/14.12.2016
- ΦΕΚ 1839/Β/25.5.2017.
- ΕΚΩΣ 2000 Greek Reinforced Concrete Regulation
- EN 15004-1[Fixed firefighting systems - Gas extinguishing systems - Part 1: Design, installation and maintenance]
- EN 15004-10[Fixed firefighting systems - Gas extinguishing systems - Part 10: Physical properties and system design of gas extinguishing systems for IG-541 extinguishant]
- EN 950 [Door leaves - Determination of the resistance to hard body impact]
- EN 1627[Burglar resistant construction products (not for precast concrete parts) - Requirements and classification]
- EN 1634 [Fire resistance tests for door and shutter assemblies - Part 1: Fire doors and shutters]
- EN 1634-3 [Fire resistance tests for door and shutter assemblies - Part 3: Smoke control doors and shutters]
- EN 1192[Doors - Classification of strength requirements]
- EN 12424 [Industrial, commercial and garage doors and gates - Resistance to wind load – Classification]
- EN 12444[Industrial, commercial and garage doors and gates - Resistance to wind load - Testing and calculation]
- EN 10595[Resilient floor Coverings-Semi-flexible polyvinyl chloride tiles-Specification]
- EN 1087[Resilient, textile and laminate floor coverings-Classifications]
- EN 13164[Thermal Insulation products for buildings-Factory made products of extruded polystyrene foam (XPS)-Specification]
- EN 13318 [Screed material and floor screeds - Definitions]
- EN 13813 [Screed material and floor screed –Screed Material-Properties and Requirements]
- EN 179 [Building hardware. Emergency exit devices operated by a lever handle or push pad, for use on escape routes. Requirements and test methods]



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- EN 442, 16430 [Testing of the heat output of radiators and convectors in acc. w. EN 442-2 and 16430-2. Accredited.]

### **3 ACRONYMS**

- RCC Remote Control and Communication
- EN European Norms

## **4 RCC BUILDING FRAME CONSTRUCTION**

### **4.1 GENERAL**

The construction of RCC building shall be a single storey conventional reinforced concrete building frame with masonry infills.

The building shall have no internal partitions and shall be featured in a single room layout, housing control/instrumentation/electrical/mechanical installations required for pipeline operation.

Alternative option of RCC building construction shall be structural steel frame.

The design of RCC shall comply with the minimum design requirements set in this specification as well as in other project specifications, codes and standards listed in paragraph 2.

Indicative layout of the RCC building is given in the standard drawing STD-0-47-01.

### **4.2 REINFORCED CONCRETE FRAME AND FOUNDATION**

The bearing structure of the building shall consist of reinforced concrete frame. The lateral load resisting system of the building shall consist of moment resisting frames along both building directions. The bearing structure and foundation is constructed with concrete grade C25/30 and grade B500C reinforcement.

Roof construction consists of two-way concrete slab cast monolithically with the building frame. Minimum thickness of the roof slab is 20cm. Roof slope shall provide adequate



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water discharge. Roof slope towards all roof drains shall be 2.5%. The roof slab is supported by reinforced concrete beams along its perimeter. The slab cantilevers 50cm outside the perimeter roof beams. A concrete parapet 50cm high is provided along the entire roof perimeter. Roof beams are arranged on the building grid along the building perimeter. Roof beams shall have a rectangular cross section. Ground floor columns supporting the roof beams shall be arranged at the building corners. Columns shall have a fair faced concrete finish and form part of the building facade.

The foundation of the building consists of reinforced concrete mat foundation to provide the required concrete paving around the building. Minimum thickness of the foundation shall be 50cm. The top surface of the foundation will be placed minimum 0.20m above final ground elevation. The foundation is cast on 10 cm thick lean concrete layer placed on top of a 0.50m compacted crushed aggregate base course.

### **4.3 MASONRY WALLS**

External RCC building walls shall be of brick masonry construction. Brick masonry construction shall consist of hollow clay bricks laid in Portland cement/lime mortar forming cavity walls (2 wythes).

Brick masonry shall be erected on the building mat foundation and shall be wedged to perimeter building columns and roof beam/slab. In order to avoid thermal bridges and provide a continuous thermal insulation layer for the building walls, the outer wythe of the masonry wall is recessed with respect to the structural frame.

Openings shall be foreseen as required in the masonry walls to facilitate routing of conduits outside the building. All masonry wall openings shall be suitably sealed and their exact location shall be determined during Detail Engineering.

The two wythes of the wall shall be joined at mid-height of the masonry with cast in place, continuous, reinforced concrete bond beams. The bond beams shall be doweled to the reinforced concrete columns of the RCC building structural frame.



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Extruded-polystyrene board thermal insulation shall be placed in the wall cavity. Extruded polystyrene board (XPS) shall be minimum 8cm thick and shall be mechanically fastened to interior face of outer wythe of cavity wall. The inner face of the bond beam shall also be insulated with a strip of extruded polystyrene board with 3cm minimum thickness. The Contractor is responsible to verify the cited insulation material thicknesses according to the results of the building thermal insulation study furnished by the Contractor during the course of Detail Engineering.

### **4.3.1 Painting**

All interior surfaces of RCC building shall be painted with two coats of high performance emulsion paint after surface preparation and application of interior emulsion primer sealer.

All exterior exposed fair faced concrete and plaster surfaces shall be painted with two coats of 100% acrylic high performance exterior paint after surface preparation and application of waterproof acrylic undercoat.

Colour shade of RCC building internal surfaces and external plaster surfaces shall be off-white. Colour of RCC building external fair faced concrete surfaces shall be light grey (RAL 7035). Alternative colour shades may be specified following Client written instruction.

## **4.4 STEEL FRAME DESIGN AND FOUNDATION**

The load bearing system of the building may also be a simple structural steel frame consisted of standard profiles to EN Standards. Indicatively, the steel frame shall consist of four HEA columns braced with IPE and/or HEA beams in both directions. Lateral stability of the frame shall be provided by means of X- bracings adequately arranged in vertical planes along the weak axis as well as in the roof plane.

The roof shall be made of double inclination (max 10%), covered each side with electrostatically painted metal sheets of 0.5mm. Roofing and siding shall be made of two way prefabricated steel sheet panels with Rockwool insulation.





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Roofing and siding of the building shall be made of prefabricated steel sheet panels with mineral wool insulation.

The foundation of the building shall consist of a cast-in-place reinforced concrete mat foundation. Minimum acceptable thickness of the mat foundation is 40cm, and it shall be constructed on top of a 40cm thick coarse aggregate layer. The bottom of the foundation shall be at least 20cm below the lowest point of the existing ground.

Lean concrete of minimum thickness 5cm shall be provided under all footings.

#### **4.4.1 Painting**

The external walls of the building as well as the internal partitions and the false ceiling, would be constructed from prefabricated panels with a fireproof index EI 60 according to EN 1364 covered from two galvanized iron sheets of min.0.5mm thickness each, electro statically painted white (RAL 97035) and slightly formatted, in a sandwich type, with minimum 80 mm of mineral wool in between, for thermal insulation.

## **5 ELECTRICAL POWER SYSTEM**

The Power Supply Voltage Level shall be 230 / 400V, 3 phase, 50 Hz from Public Power Corporation (P.P.C).

The power system shall consist of:

- A Main Distribution Switchboard, installed inside R.C.C. Building, designed to supply all electrical users and being fed by two (2) sources of power (one from PPC and one from mobile emergency power supply system).
- Uninterruptable Power Supply System (UPS) with Battery Back-up.
- Lighting System including indoor / outdoor lighting fixtures, fittings, supports, cables etc.
- Socket Outlets installation (220V, 1 phase, 16A and 380V, 3 phase, 32A).
- Grounding installation for all non current - carrying metal parts of equipment, metal work, cable sheaths, lighting fittings, switches, socket outlets etc).
- Lightning Protection System.
- Fire Alarm System consisting of: Manual Fire Alarm Station, Smoke Detectors, Fire Alarm Control Panel and Alarm Devices.



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- Security Alarm System consisting of: Door Violation Sensors, Infrared Intrusion Detector, Security System Control Panel, Alarm Devices.
- Electrical Power System.

## **6 FIRE FIGHTING**

### **6.1 FIRE EXTINGUISHING SYSTEM**

The extinguishing agent shall be INERGEN (IG-541).

The fire extinguishing system shall be designed and installed according to EN 15004-1 and EN 15004-10.

It shall be approved by a recognized organization (i.e. UL listed, FM or VdS approved).

The system will be automatically operated by means of a two-line dependence arrangement of fire detectors. This arrangement means that response of a detector triggers an audible alarm, while the extinguishing system is only released when another detector of the second line also responds.

The two-line dependence will be by-passed only by pushing a local manual released push-button.

The system will mainly consist of the following:

- Cylinders Battery on a common base.
- Permanent pipe network.
- Manifold.
- Connection hoses.
- Quick action valves.
- Actuators.
- Pressure reducers.
- Weighing device for cylinders.
- Device for manual actuation.
- Retaining straps.



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## **7 BUILDING FINISHES**

### **7.1 FLOOR COVERING**

The floor inside the building shall be 40cm elevated from the highest point of the surrounding ground surface. Concrete paving shall be provided around the building walls. Concrete paving shall be at least 20 cm thick, top surface shall be 20cm lower than the internal floor, slopping 2% outwards and shall be brushed in order to provide a smooth non slippery paving. This paving shall be continuously cast with the foundation, in order to avoid the formation of any construction joint.

Flooring will consist of anti-static, resilient PVC tiles, suitable for industrial areas.

Tiles will be placed on a leveled grout layed on the concrete slab. Dimensions shall be at least 30\*30\*2 and the colour shall be grey.

### **7.2 ENTRANCE DOOR**

The fire proof entrance door shall be hollow metal steel door. Fire resistance of the entrance door shall be in accordance with the relevant fire design and will be equipped with security lock according to EN179. The insulation layer of the door should consist of rock wool of 1650 KN/m<sup>3</sup> density. Lock and hinges will be also fire resistant. Doors will be painted blue (RAL 5015) with anti-corrosive paint (primer in two coats) and a final coat of oil paint.

### **7.3 FIRE RESISTANCE**

The load bearing system and shell of the building shall be 60 min fire resistant.

### **7.4 THERMAL PERFORMANCE**

Heating, Ventilation, and air-conditioning shall be designed. A minimum 5cm thick thermal insulation shall be provided in wall and roof, as well as under the floor.

#### **7.4.1 Heating**

Radiators shall be made of steel plates. Thermal efficiency shall be determined according to EN 442, 16430.



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The material of hot water pipes shall be copper properly insulated.

A single pipe system shall be adopted.

### **7.4.2 Cooling**

Each cooling system shall have an outdoor electrical unit. The outdoor unit shall feed a number of indoor units, as required, with Freon 407 or equivalent coolant.

## **8 MAIN DISTRIBUTION SWITCHBOARD AND SUB-DISTRIBUTION SWITCHBOARDS**

A main low voltage switchboard shall be installed inside each RCC building, designed to feed all electrical loads.

The main switchboard inside each RCC building shall be fed by three incoming circuit breakers (concerning normal power supply system, one from photovoltaic panels installed in the field and one from PPC to feed electrical users, in case those photovoltaic panels are not sufficient to cover power supply requirements, as well as one from emergency power supply system).

The emergency power supply system shall be emergency portable diesel generator, through an incoming socket, suitable to supply all loads, which shall be fitted on the outside wall of each RCC building. In case that M or MR station is constructed in the future, emergency power supply system shall be provided by future M or MR station.

## **9 QUALITY ASSURANCE**

It is Contractor's responsibility to properly complete quality forms, which are applicable for the execution of said works, in accordance with specifications and codes.

The relevant quality forms and material-laboratory certificates shall be submitted once available to the Client's representative for approval and acceptance of the works.