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1 BASIS FOR DEVELOPMENT OF DETAILED DESIGN DOCUMENTATION PACKAGE

1.1 This package of the Detailed Design documentation was developed in compliance with the schedule of the Detailed Design documentation issue according to General Contract No. 3278/PKS2.

1.2 Technical solutions adopted in the Detailed Design drawings meet the laws and regulatory requirements of Hungary, international requirements, standards and documents of the Project, and ensure the safety of NPP operation for people's life and health provided that the measures presented in the Detailed Design drawings are observed.

2 DESCRIPTION OF COORDINATE SYSTEM

2.1 The project coordinate system is used in the Detailed Design drawings. The project coordinate system is the local one; it is designated with lowercase letters x, y, and z.

2.2 The origin point in the project coordinate system ($x = 0$, $y = 0$, and $z = 0$) is located in the center of the reactor building of Unit 5 (50UJA) and corresponds to coordinates $X = 12264.00$ and $Y = 1297.00$ of the construction grid in the PAV system, at absolute elevation +97.150.

2.3 The angle of positive direction of x-axis in the project coordinate system (x, y, z) related to positive direction of X-axis of the construction grid in the PAV system is 90° .

2.4 Direction of the axes in the project coordinate system (x, y) is as follows:

a) Positive direction of x-axis in the project coordinate system corresponds to the direction of radial axis 0° (360°) in the polar coordinate system of the reactor building (towards building UKD);

b) Positive direction of y-axis in the project coordinate system corresponds to the direction of radial axis 90° in the polar coordinate system of the reactor building (towards building UKA).

2.5 The project coordinate system (x, y, and z) corresponds to the coordinate system of the 3D model.

3 TECHNICAL REQUIREMENTS FOR SSC

3.1 The following Requirement Specifications are used in this Detailed Design documentation package:

a) "Technical Specifications for High Pressure Stainless Steel Pipelines not Regulated by Nuclear Energy Use Safety Regulatory Documents (Class 4)"
PKS2.B.P000.&.&&&&&&&&&.000.SG.0028.E;

b) "Technical Specifications for Drains of Class 4"
PKS2.B.P000.&.&&&&&&&&&.000.SG.0012.E.

4 INSTALLATION AND CALCULATION BOUNDARIES

4.1 This package of the Detailed Design documentation provides for design of the pipelines of collection and transfer system for fire-fighting drains 50GML10 laid in the foundation slab at the elevation of minus 19.300.

4.2 For installation boundaries, see the local P&I diagram of pipelines. The local diagram is based on the P&ID of system GM PKS2.B.P000.&.0503020303&&.052.DP.0001.E.

4.3 The layout of pipelines is made in accordance with the following civil engineering drawings of the reactor building:

a) PKS2.D.P000.5.0UJA99&&&&&.012.DC.0003.E.

5 SURFACE PROTECTION REQUIREMENTS RELATED TO SSC

5.1 Corrosion protection is not applied to the pipelines of this package.

6 THERMAL INSULATION REQUIREMENTS RELATED TO SSC

6.1 Thermal insulation of pipelines is not required.

7 IDENTIFICATION/MARKING REQUIREMENTS RELATED TO SSC

7.1 Color coding is not required for pipelines laid in concrete.

8 DOCUMENTATION/CERTIFICATION REQUIREMENTS RELATED TO SSC

8.1 Certification requirements are described in PAKSII-PM-12.0.06 “Quality Assurance Program for Manufacturing (QAP (M))”, Section 1.4 and PAKSII-PM-12.0.09 “Quality Assurance Program for Construction (QAP (Con))”, Section 3.5 and the Supply Contract.

8.2 The Subcontractor shall be duly licensed and certified to arrange the manufacture and installation of equipment and pipelines.

8.3 Technical conditions for drains are described in TZ-173-2022.

9 REQUIREMENTS RELATED TO SUBCONTRACTORS

9.1 For the requirements for the Subcontractor, see the following documents: PAKSII-PM-12.0.06 “Quality Assurance Program for Manufacturing (QAP (M))”, PAKSII-PM-12.0.09 “Quality Assurance Program for Construction (QAP (Con))”.

10 INSTALLATION REQUIREMENTS RELATED TO SSC

10.1 Installation of pipelines shall be in accordance with the requirements of MSZ EN 13480-4:2018 and MSZ EN 12056-5:2001.

10.2 Pipeline slope shall be arranged during installation in accordance with the axonometric installation diagram.

10.3 Pipelines are installed after installation of space cages prior to placing of the reinforcement upper layer. In places of drain installation, the cage reinforcement is cut out in situ. Pipelines are fixed to reinforcement thus ensuring that pipelines are not moved and specified slopes are maintained during concreting. The distance between the fasteners shall be no more than 6 m. To avoid corrosion, gasket made of synthetic materials shall be installed at the points of contact of the pipeline and drains with reinforcement and fasteners.

10.4 After installation, pipelines running from floors shall be temporarily plugged at design boundaries.

10.5 Materials for temporary fastening of pipelines and drains during installation are included in the scope of responsibility of the installation organization.

11 QUALITY CONTROL REQUIREMENTS RELATED TO SSC

11.1 A quality assurance category is assigned in accordance with PKS2.B.P000.5.0311&&&&&&&&&.089.YH.0001.E.

11.2 The Manufacturer shall elaborate its own QAP (M) according to PAKSII-PM-12.0.06 “Quality Assurance Program for Manufacturing (QAP (M))”.

11.3 The Installation Organization shall elaborate its own QAP (Con) according to PAKSII-PM-12.0.09 “Quality Assurance Program for Construction (QAP (Con))”.

12 WELDING REQUIREMENTS RELATED TO SSC

12.1 The requirements for welded joints and materials are provided in PKS2.B.P000.5.0311&&&&&&&.021.HE.0001.E “Materials”.

12.2 Welding of pipelines shall be made in accordance with the requirements of MSZ EN 13480-4:2018, MSZ EN ISO 3834-5:2022 and welding procedure specifications (WPS). Welding procedure specifications in terms of welding of pipelines (WPS) shall comply with MSZ EN ISO 15609-1:2020.

12.3 Edge preparation for welding and welded joints shall be performed as per MSZ EN ISO 9692-1:2014 (a weld type is 1.5), MSZ EN ISO 9692-2:2000, MSZ EN 1708-1:2010 and the applicable WPS.

12.4 KKS code of the weld in the drawing is provided for welds from different isometrics. Welds from the current isometric are shown in the drawing by a position number, and the KKS code is provided in the list of welds.

13 FIRE PROTECTION REQUIREMENTS RELATED TO SSC

13.1 The pipelines are made of stainless steel; no fire protection is required.

14 TESTING AND INSPECTION REQUIREMENTS RELATED TO SSC

14.1 The inspection and test requirements are provided in PKS2.B.P000.5.0311&&&&&&.021.HE.0001.E “Materials”.

14.2 Inspection and testing shall be in accordance with the requirements of MSZ EN 13480-5:2017.

14.3 Methods and scope of testing of field welded joints are selected according to MSZ EN 13480-5:2017 and are given in Table “List of methods and scope of testing of field welded joints”.

14.4 Hydraulic tests of pipelines shall be in accordance with the requirements of MSZ EN 13480-5:2017.

14.5 Hydraulic tests of pipelines laid in cast-in-situ concrete are to be performed prior to the beginning of concrete casting.

14.6 Selection of non-destructive testing methods for detection of welding imperfections (volumetric testing) in full penetration joints is based on MSZ EN ISO 17635:2017.

14.7 Non-destructive testing:

a) Visual inspection and measurement shall be carried out according to MSZ EN ISO 17637:2017.

b) Penetrant testing shall be carried out according to MSZ EN ISO 3452-1:2021.

14.8 Destructive testing: intergranular corrosion tests of field welded joints are mandatory in accordance with MSZ EN ISO 3651-2:1999.

14.9 Quality Assurance Program for Manufacturing (QAP (M)) is described in PKS2.S.J000.9.&&&&&&&&.053.ZR.0005.E (QAP (D, M) 10-14-2021).

14.10 Quality Assurance Program for Construction (QAP (Con)) is described in IMS-PAKSII-ENG-12-09-22.

15 GRAPHIC SYMBOLS AND LEGEND

15.1 Graphic symbols and legend are adopted in accordance with procedure PKS2.P.P000.&.04&&&&.089.YP.0001.E.

16 TECHNICAL CHARACTERISTICS REQUIREMENTS RELATED TO SSC

16.1 The following data are given in Table of technical characteristics of pipelines for pipeline sections:

a) Safety class is in accordance with PKS2.C.P000.&.000.YH.0002.E;

b) Seismic class is in accordance with
PKS2.C.P000.&.&&&&&.&&&&&&.000.YH.0002.E;

c) Material for pipelines of safety class 4 is 1.4571 in accordance with MSZ EN 10216-5:2021;

d) Operating pressure is in accordance with MSZ EN 764-1:2015+A1:2017;

e) Operating temperature is in accordance with MSZ EN 764-1:2015+A1:2017;

f) Design pressure is in accordance with MSZ EN 764-1:2015+A1:2017;

g) Design temperature is in accordance with EN 764-1:2015+A1:2017.

17 FABRICATION REQUIREMENTS RELATED TO SPOOLS

17.1 There are no spools.

18 REQUIREMENTS FOR SUPPORT-HANGER SYSTEM

18.1 Supports and sub-supporting structures are not required.

19 SPECIFICATIONS FOR SSC

19.1 Summary specifications for SSC presented in isometric installation diagrams are given in PKS2.D.P000.5.0UJA99GML10&.052.SD.0001.E.

20 BILL OF QUANTITIES

20.1 Bill of quantities for installation of SSC presented in isometric installation diagrams is given in PKS2.D.P000.5.0UJA99GML10&.052.BG.0001.E.

21 SERVICE LIFE OF PIPELINES

21.1 Service life of system is 80 years. Justification of the reliability of pipelines is presented in PKS2.B.P000.&.&&&&&&&&&&.000.HG.0105.E.

21.2 To ensure a service life of 80 years and the subsequent decommissioning period, pipes made of high-alloy steel X6CrNiMoTi17-12-2 (1.4571), which has a low rate of general corrosion under these operating conditions, were applied for the pipelines located inside civil engineering structures. This type of pipes has high resistance to intercrystalline, pitting and other types of local corrosion. After the decommissioning period and in the case of failure of pipelines inside civil engineering structures, the failure of civil engineering structures is excluded by the strength calculations (by weakening of the cross section in the places of laying of pipes)..