NUCLEAR POWER PLANT KRŠKO

Chemistry Department

TECHNICAL SPECIFICATION

DESIGN AND MANIFACTURE OF A SHIELDED FORKLIFT

Rev. 0

Classification: NSR – Non Safety related

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1. Activity

- Technical specification provide requirements for the procurement of design and manifacturing of an electrical shielded forklift. The product - forklift is intended for transportion of a radioactive material (particularly stored in drums) with surface dose rates up to 100 mSv/h. The shielded forklift shall be designed in accordance with the requirements listed below so that it corresponds to the planned area of use and the intended load. The forklift design can be performed in two shielding forms: a) for drums with lower surface dose rate – up to 40 mSv/h and b) for drums with higher surface dose rate – up to 100 mSv/h.

2. Scope

The scope includes:

- procurement of a shielded forklift with technical characteristics as stated and required in paragraph 7.1 and 7.2,

3. Safety classification

The service is clasified as Non Nuclear Safety Related activity (all other activities).

4. Type of service

The procurement of a design and manifacture of shielded forklift will be carried out via public tendering with fix price.

5. Codes , Standards and Procedures

The shielded forklift shall be made in compliance with applicable regulations and standards and shall meet CE requirements and other requirements from paragraphs 7 and 8.

5.1 Familiarity with NPP K rško Documentation and Procedures

N/A

6. Identification of equipment and components

Electric forklift for indoor and outdoor use equipped with:

- Hydraulic gripper for drum grabbing. The sketches of drums are in the appendices 1-6.

- Radiation protection shielding (steel or lead glass).
- Cameras to provide driving through a video surveillance system.

7. Technical requirements

7.1 The shielded forklift shall meet the following requirements:

- Nominal load capacity, Q = 4500 kg
- Load center, c= 500 mm
- Solid non-marking tires
- Wheels, number front = 2, number rear = 2
- Forks: d= 50mm, w= 120 mm, l= 1250 mm
- Maximum overall lenght, l1= 4200 mm
- Maximum length to fork face, l2= 2950 mm
- Maximum width, b1= 1500 mm
- Fork carriage: side shift
- Maximum ground clearance, m1= 150 mm
- Turning radius approximatley, Wa 2350 mm
- Minimum pivoting point distance, a/2= 100 mm
- Ergonomic seat installed
- Multifunctional display
- Electro-hydraulic distributor with mini fingers / mini levers
- Forward / reverse switch and horn button installed in Grammer armrest

7.2 The mast shall meet the following requirements:

- Mast type: two stage mast with free lift
- Maximum height of mast, h1= 2500 mm
- Minimum free lift, h2= 1350 mm
- Minimum lift, h3= 3150 mm
- Maximum height of extended mast, h4= 4500 mm
- Maximum height of overhead guard, h6= 2450 mm

7.3 The gripper shall meet the following requirements:

- The hydraulic gripper / clamp for drums must have a minimum load capacity of 2600 kg. The forklift can have more than one gripper if it is more suitable for design. That means one gripper can be intended for tall and heavy drums (up to 2600 kg), one for low and light drums (up to 900 kg). The gripper(s) shall be designed to clamp the drums (appendices 1-6).
- The gripper must be compatible with forklift end easily removable.

7.4 Driving requirements:

- Drive motor: minimum 2 x 12 kW
- Lift motor: power rating at S3 15%: minimum 20 kW
- Battery voltage: 80V
- Battery capacity: min 900 Ah
- Type of drive: electric
- Battery charger included

7.5 Safety functions

- Travel speed with / without load limited up to 15 km/h
- Lifting speed with load up to 0,20 m/s
- Lowering speed with load up to 0,25 m/s
- Automatic control of gripper / forks height
- Minimum climbing ability with load: 10 %
- Horn
- Alarm in reverse gear
- Flash lamp
- Cameras with cabin monitor for front (3 cameras) and rear (1 camera) visibility with sufficient resolution for safe driving

7.6 Shielding

- The forklift design shall provide efficient shielding for dose reduction. Sufficient radiation protection is requred for drums with contact dose rates up to 100 mSv/h in the way that the dose on operators driving seat does not exceed 1 mSv/h.

7.7 Documentation

- Instructions or manuals for use and maintenance of the forklift.
- Instructions or manuals for use and maintenance of video surveillance system.
- Recomended spare parts list for video surveillance system.
- Dose reduction calculations; dose rate reduction factor for Cs-137 (Cesium 137) should be minimum: a) Factor 39 for drums with dose rate up to 40 mSv/h, b) Factor 99 for drums with dose rate up to 100 mSv/h so the dose at operators seat does not exceed 1 mSv/h.
- Load test report (static and dynamic report).
- Certification of shielding materials.
- Declaration for clamp/gripper.
- All required attestations and certificates for the forklift.
- FAT and SAT test reports.

8. Qualification Requirements

The forklift shall be CE certified and shall be equipped with all safety equipment necessary to perform work in accordance with the instructions for use, the required standards and legal bases.

9. Detail Schedule

The shielded forklift is expected to be manufactured and delivered to the client until December 20th, 2024. Upon delivery, all the required documentation shall be provided and FAT (Factory Acceptance Test) and SAT (Site Acceptance Test) confirmed by NEK representatives.

10. Supplier's Responsibilities

The supplier must conduct an acceptance test at the client's location, demonstrating all the required functionalities specified in this specification.

Provide a mainteinance manual and serviceman contacts.

11. NPP Responsibilites

NPP will provide the supplier with access to the location.
NPP responsible personnel will be available in case of ambiguity.

12. Special requirements

The forklift with its gripper/clamp, togather with the load shall be able to be meneueured and driven in all areas of radwaste storage building (RWS). A drawing of RWS with dimensions is in appendices 7-9. Maximum height of RWS doors and passages is 3 m, so the forklift shall be available to transport drums underneath.

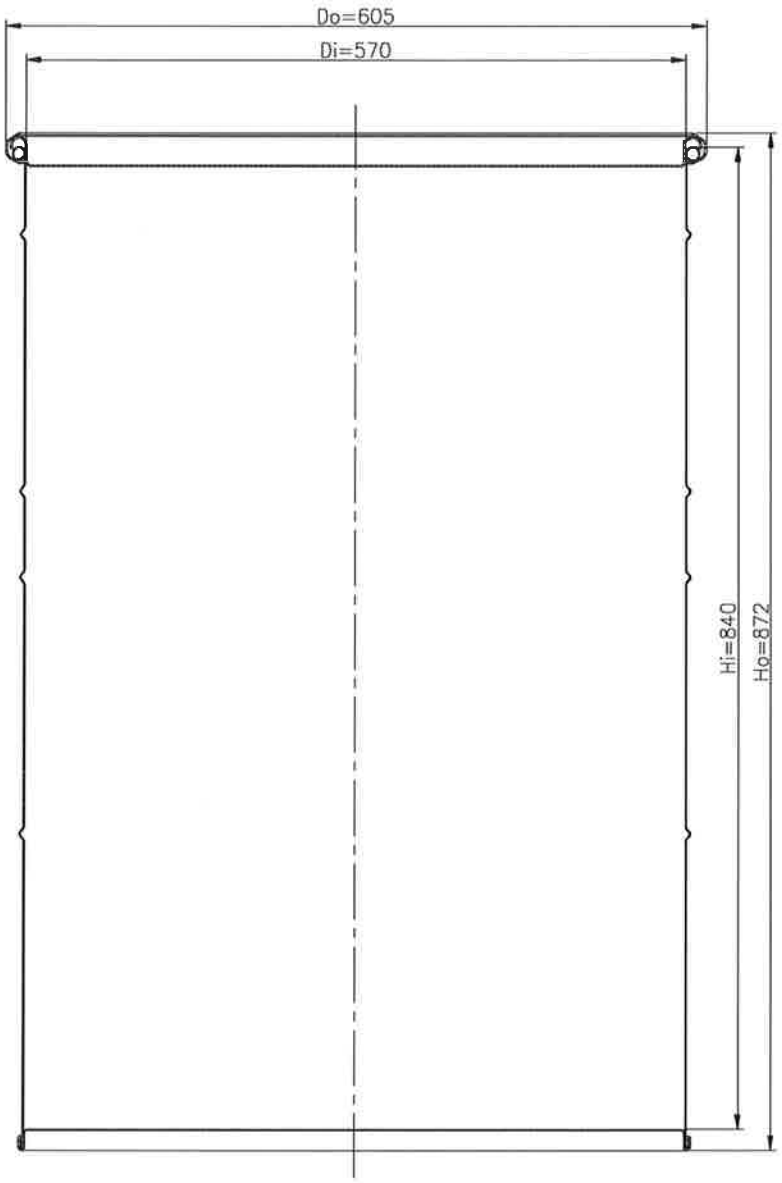
13. QA Requierments

N/A

14. Appendices

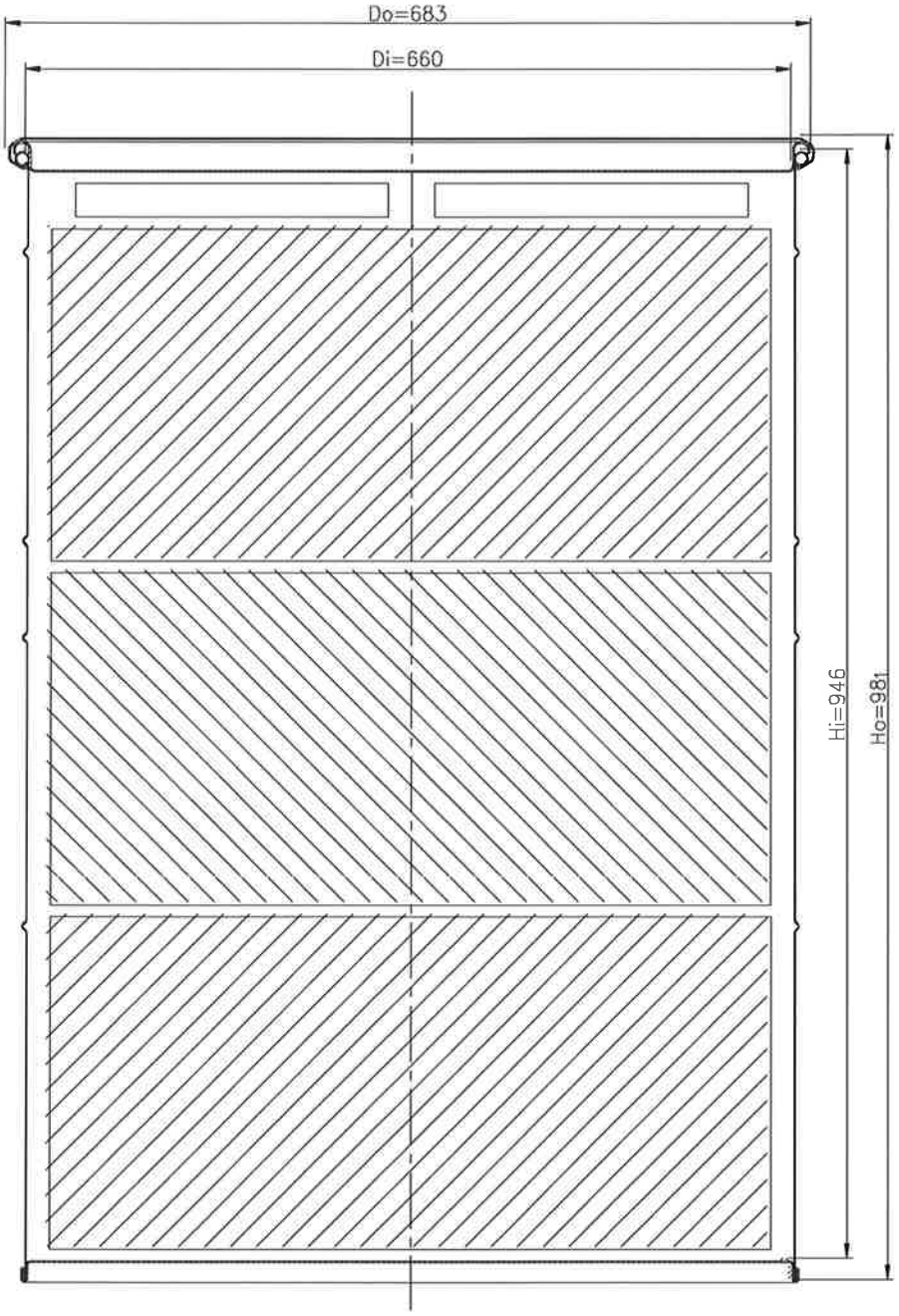
Appendix 1 - D1 drum
Appendix 2 – D6 drum
Appendix 3 – T2 drum
Appendix 4 – T1 drum
Appendix 5 – H2 drum
Appendix 6 – H1 drum
Appendix 7 – RWSB floor plan 1
Appendix 8 – RWSB floor plan 2
Appendix 9 – RWSB floor plan 3

ATTACHMENT 1: CONTAINER DRAWINGS



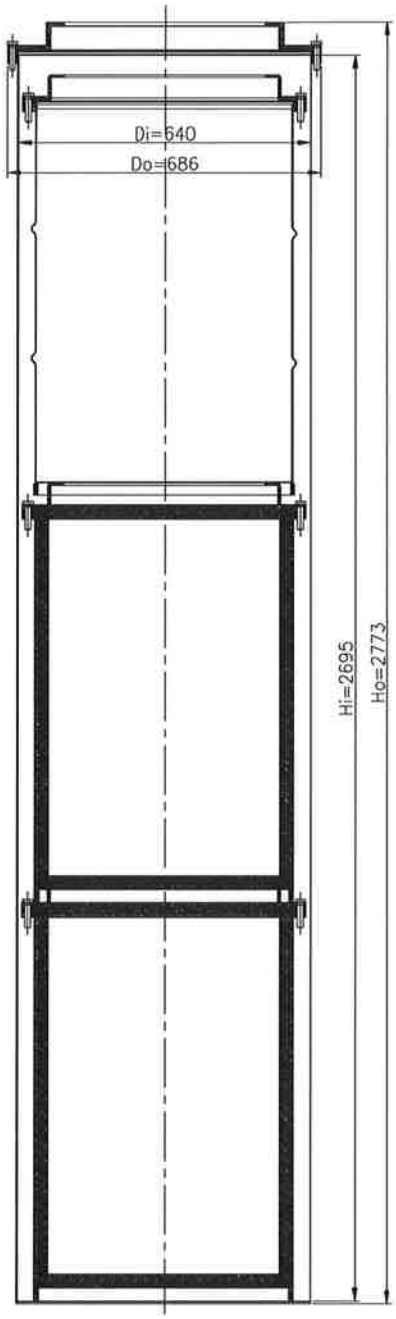
CONTAINER D1

Material: CS **Weight: 23 kg** **Volume (net): 208 dm^3**



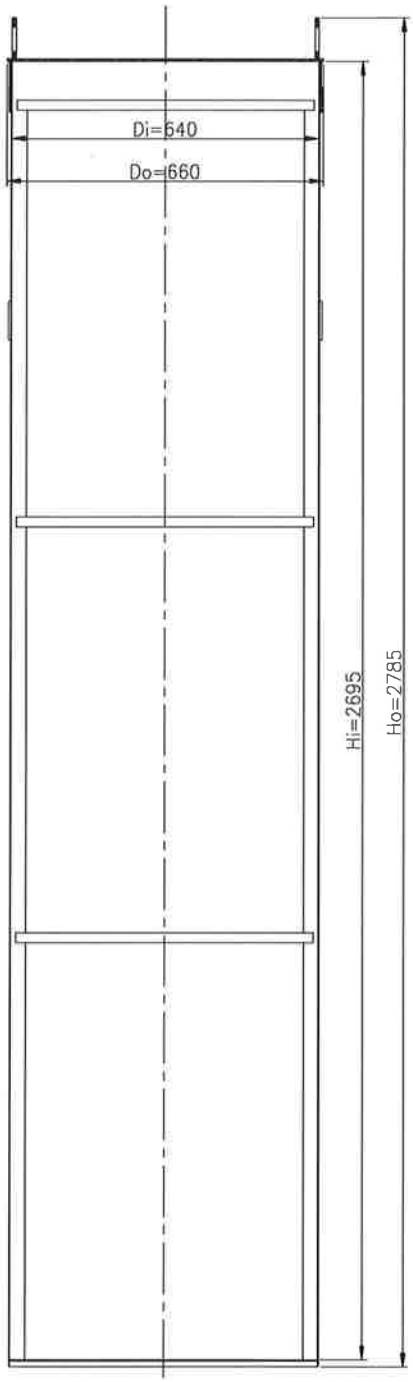
CONTAINER D6

Material: CS **Weight: 37 kg** **Volume (net): 320 dm^3**



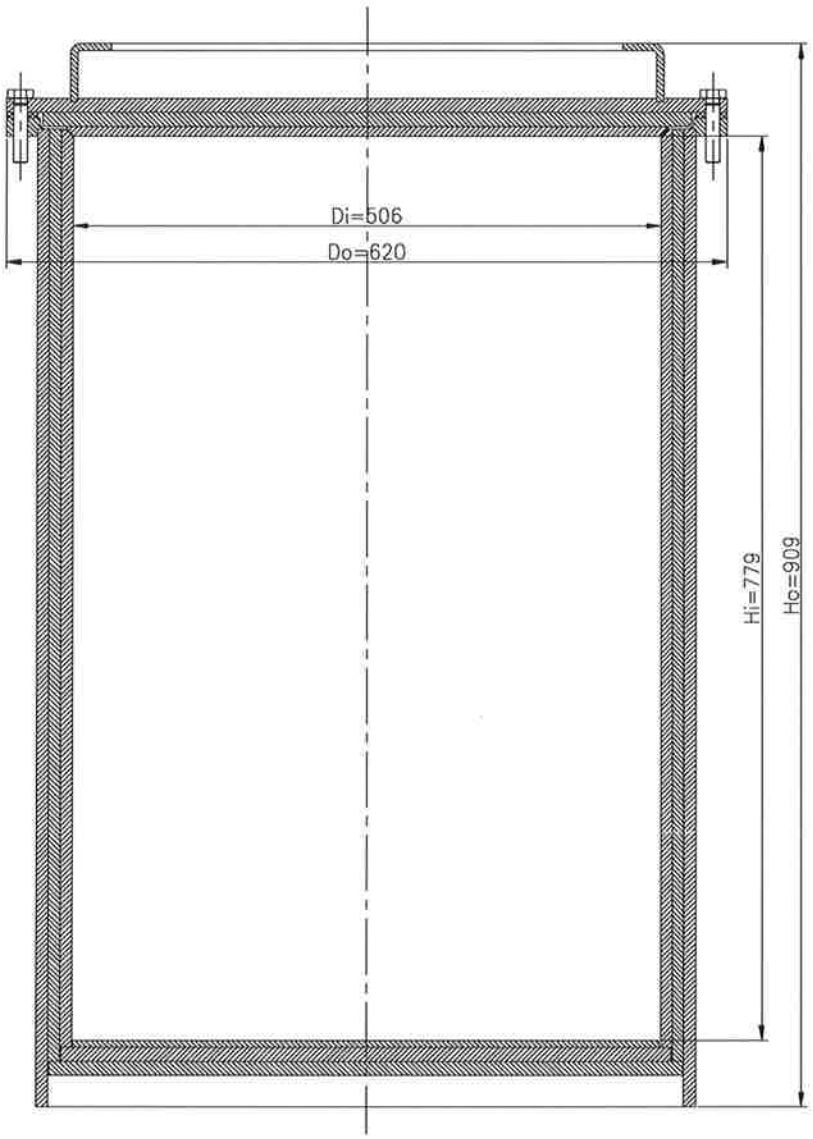
CONTAINER T2 (OVERPACK)

Material: CS **Weight: 135 kg** **Volume (net): 864 dm^3**



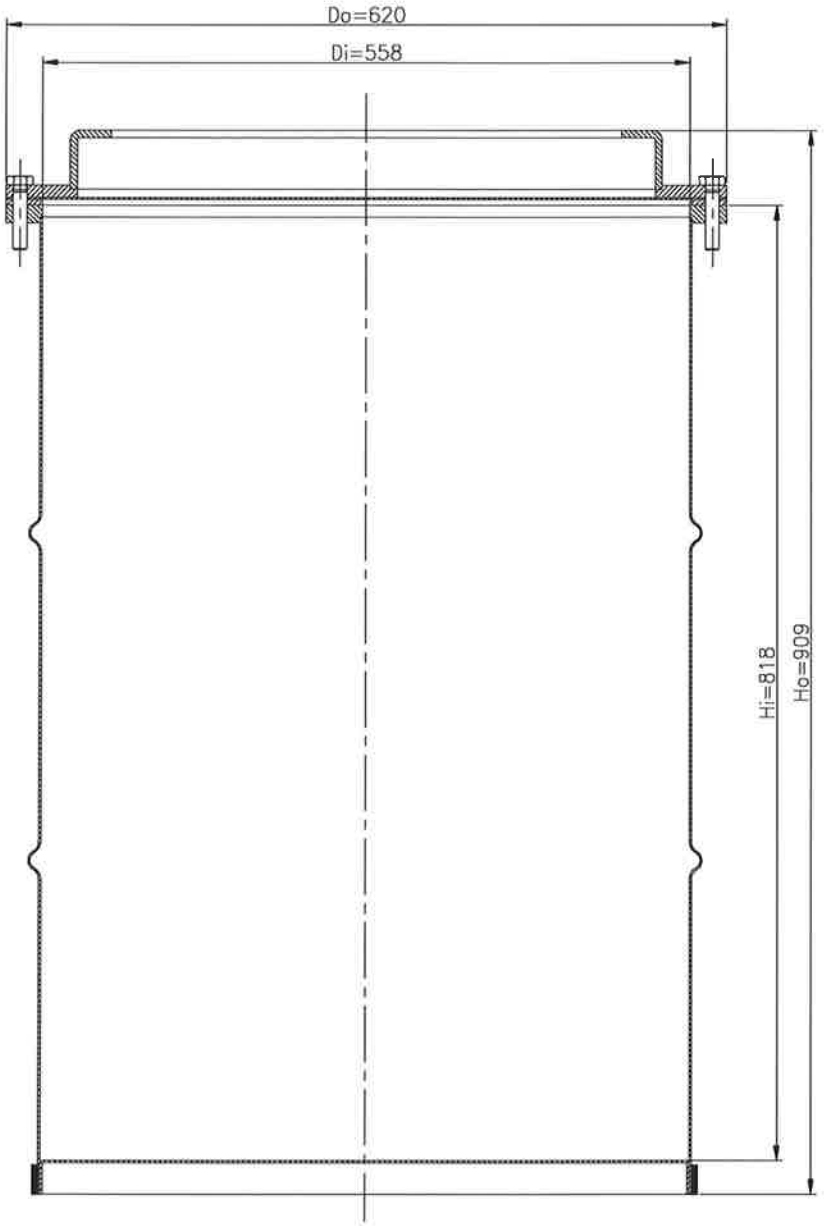
CONTAINER T1 (OVERPACK)

Material: CS **Weight: 117 kg** **Volume (net): 869 dm^3**



CONTAINER H2

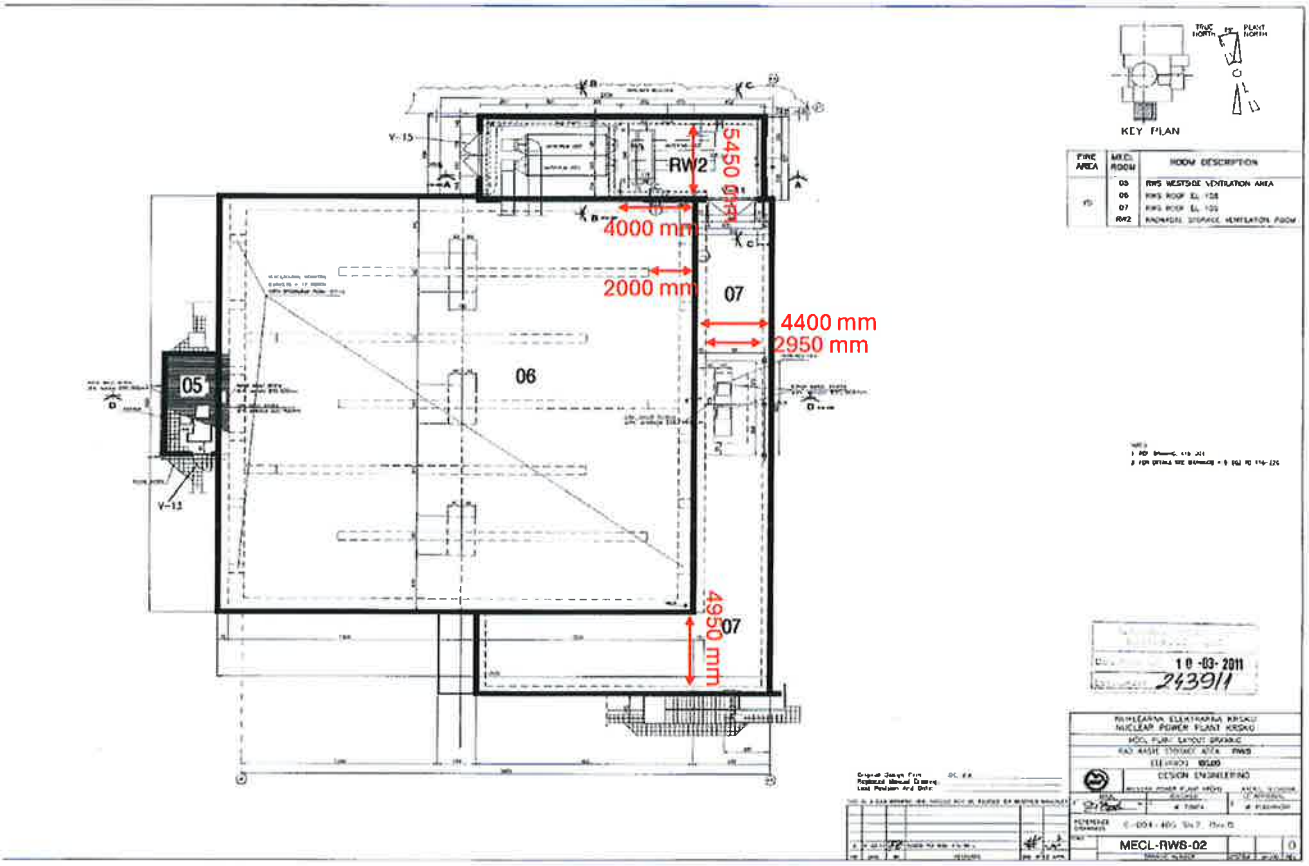
Material: SS **Weight: 450 kg** **Volume (net): 150 dm^3**

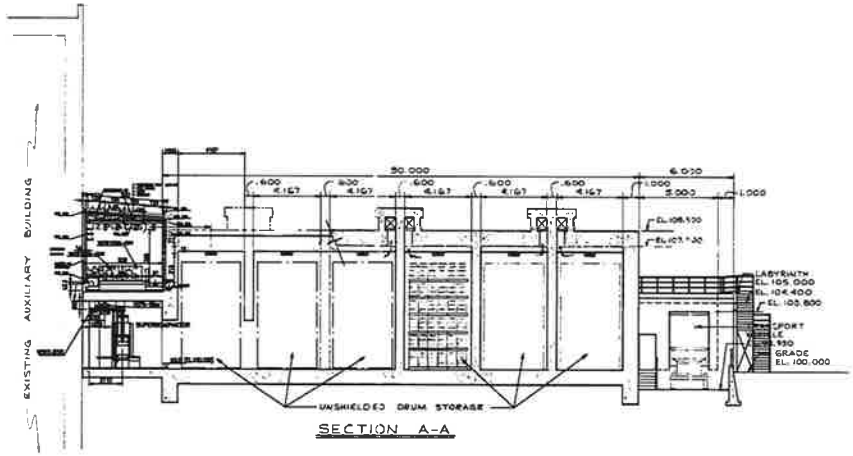


B

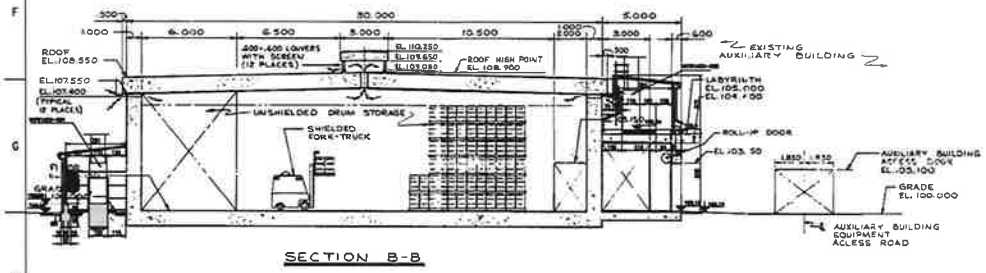
CONTAINER H1

Material: SS **Weight: 65 kg** **Volume (net): 200 dm^3**

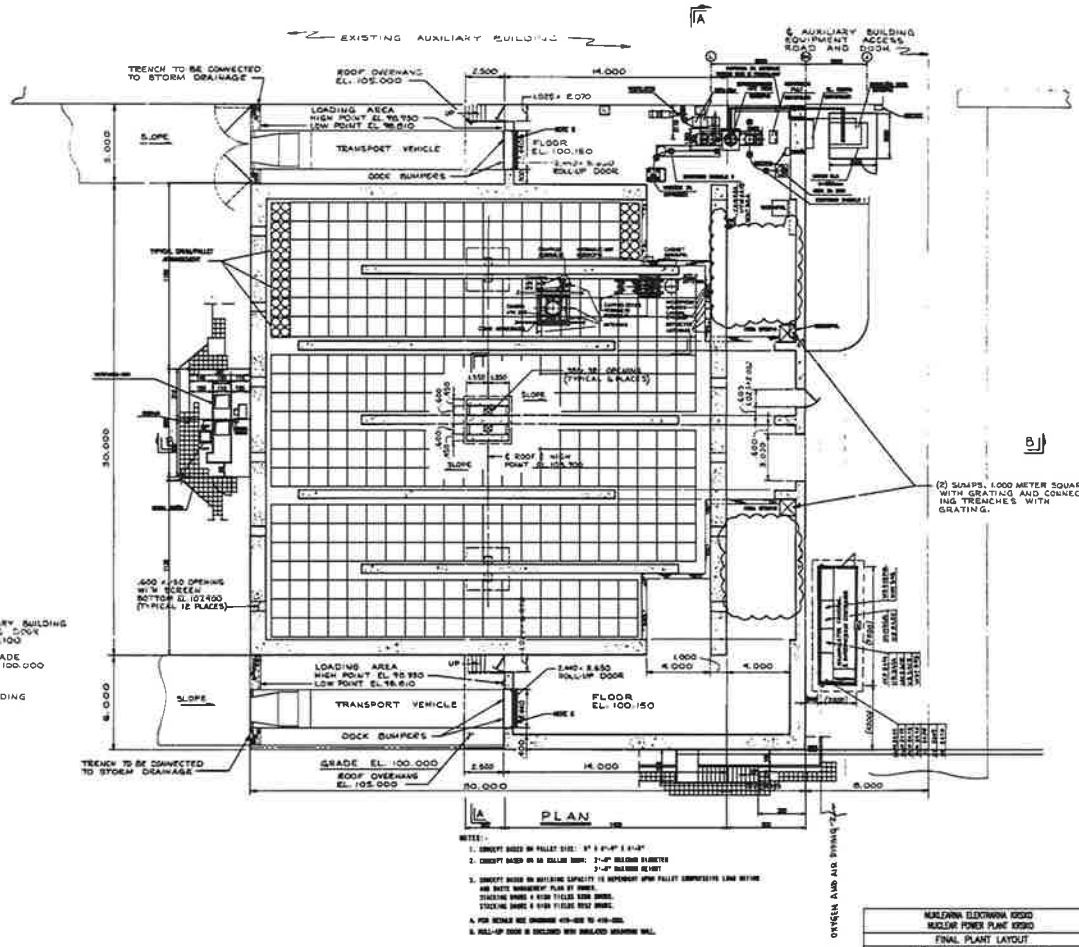

RW2
5450 mm
4000 mm
2000 mm
07
4400 mm
2950 mm
06
05
4950 mm
07
V-15
V-13
KEY PLAN
TRUE NORTH
PLANT NORTH
FIRE AREA
MECL ROOM
ROOM DESCRIPTION
05
RWS WESTSIDE VENTILATION AREA
06
RWS ROOF EL. 108
07
RWS ROOF EL. 103
RW2
RADWASTE STORAGE VENTILATION ROOM
10-03-2011
243911
MECL-RWS-02



SECTION A-A



SECTION B-B



NOTES:

1. CONCEPT BASED ON PALLET SIZE: 1" X 4'-0" X 4'-0"
2. CONCEPT BASED ON 40 KILLIS DOOR: 2'-4" BUILDING DIAMETER
   2'-4" BUILDING HEIGHT
3. CONCEPT BASED ON MAINTAINING CAPACITY TO REPRESENT APMA PALLET COMPATIBLE LINE WITHIN AIR DUCT MANAGEMENT PLAN BY OWNER.
   STACKING SHOWS 4 HIGH TIELES SIDE SHOWS.
   STACKING SHOWS 6 HIGH TIELES REAR SHOWS.
4. FOR DETAIL SEE DRAWINGS 419-005 TO 419-009.
5. ROLL-UP DOOR IS ENCLOSED WITH INSULATED MASONRY WALL.

Original Design Firm	Gilbert Associates, Inc.
Registered Licensed Drawings Last Revision And Date	[illegible] 5/24/1988

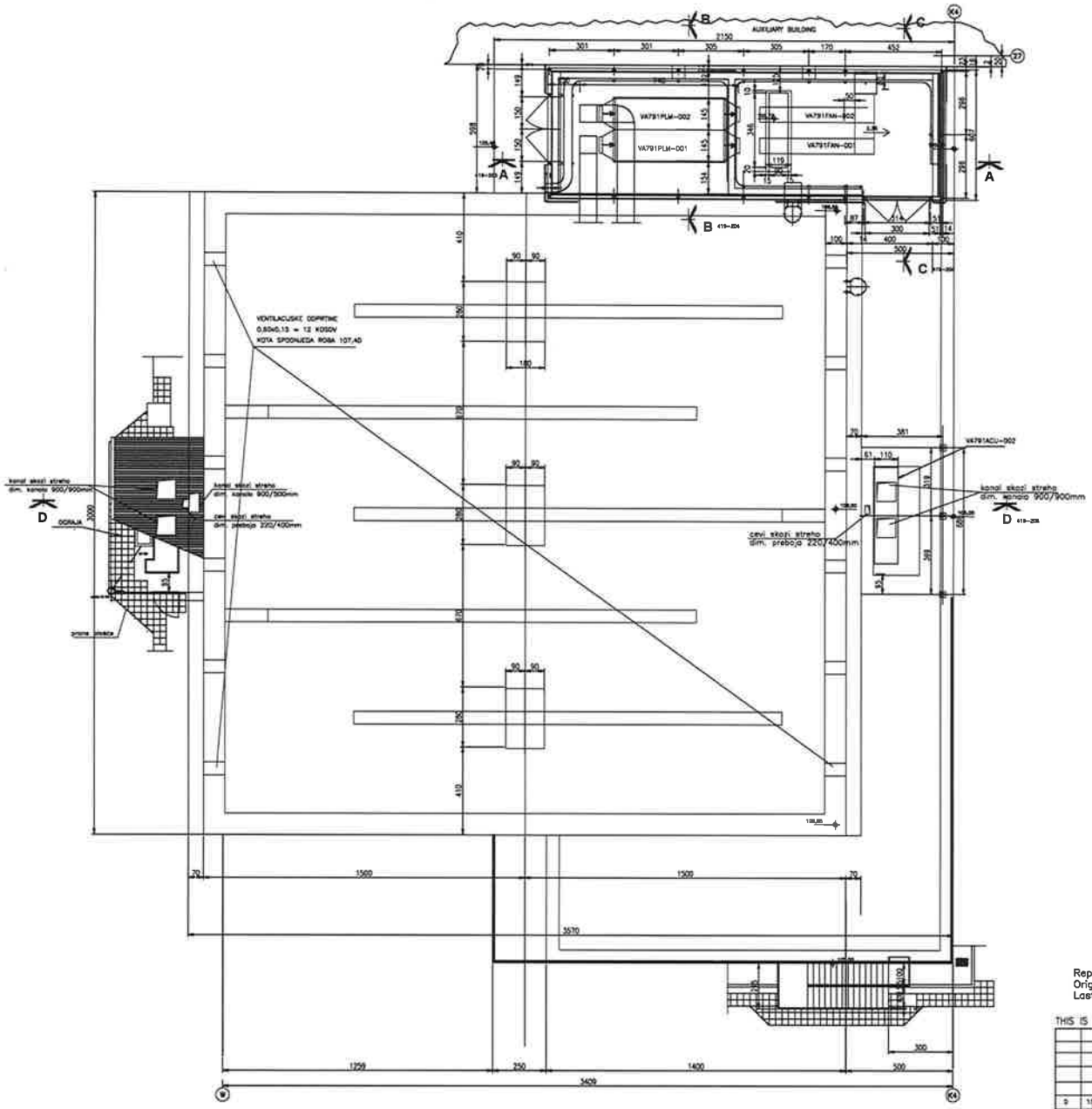
THIS IS A CAD DRAWING AND SHOULD NOT BE REVISED OR ALTERED MANUALLY				
8	09.05.96	T.T.	REVD PER CHP 2010-1071 & 2020-488	K.K.
7	07.05.96	K.K.	REVD PER CHP 2010-1078	K.K.
6	05.07.96	K.K.	REVD PER CHP 2011-1077	K.K.
5	04.05.12	K.K.	REVD PER CHP 2010-2498	K.K.
4	07.05.96	MC	REVD PER MOD 476-94-4	K.K.
NO.	DATE	BY	REVISION	CHK'D BY APPR.

NUKLEARNA ELEKTRARNA KRŠKO	
NUCLEAR POWER PLANT KRŠKO	
FINAL PLANT LAYOUT	
RADWASTE STORAGE FACILITY	
EL. 100.15	
DESIGN ENGINEERING	
NUCLEAR POWER PLANT KRŠKO	KRŠKO, SLOVENIA

SPACE	CHECKED	LE APPROVAL
L. M. KOSINC	L. M. ZADERNIK	L. D. KOSINAR

REFERENCE DRAWINGS:

SCALE	E-004-405	1	9
	DRAWING NUMBER	SYSTEM	SHEET REV.



NOTES:
1. REF. DRAWING: 419-004
2. FOR DETAILS SEE DRAWINGS 419-202 TO 419-220

Replaced Manual Drawing: NA
Original Design Firm: IBE, d.d.
Last Revision And Date: NA

THIS IS A CAD DRAWING AND SHOULD NOT BE REVISED OR MODIFIED MANUALLY

NO.	DATE	BY	REVISION	CKD. BY	LE APPROVAL
0	15.09.10	IBE	ISSUED PER MOD 475-WA-L	J.K.	J.K.

NUKLEARNA ELEKTRARNA KRSKO
NUCLEAR POWER PLANT KRSKO
FINAL PLANT LAYOUT
RADWASTE STORAGE FACILITY
EL. 105,00
DESIGN ENGINEERING
NUCLEAR POWER PLANT KRSKO KRSKO, SLOVENIA

MADE	CHECKED	LE APPROVAL
1. IBE	2. J.KERN	3. J.KERN

SCALE

C-004-405 | 2 | 0
DRAWING NUMBER | SHT. NUMBER | REV

FILE: 00440500 DWG, RLC, SPREJEL