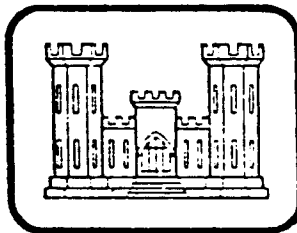


HEADQUARTERS
US ARMY ENGINEER DIVISION, EUROPE
CORPS OF ENGINEERS
APO 09757

STORAGE IGLOO, EARTH COVERED , 80 FT
=====

TYP 16
=====

SPECIFICATIONS



Prepared by: _____

US-Army Engineer-Division
Corps of Engineers

Revised by: _____ :

Ingenieurbüro Bung
Gemeinschaft beratender Ingen
Englerstr. 6

6900 Heidelberg

Telefon : 06221/37021

Datum : 01. März 1979

0.1/1

0.1
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Storage Igloo, Earth Covered
Type 16 (80 Feet)

0.2/1

0.2

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Storage Igloo, Earth Covered
Type 16 (80 Feet)

0.3/1

0.3
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COST SUMMARY AND BID SIGNATURE
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1.01 - Earth Work (DIN 18 300)	DM.....
1.02 - Concrete and Reinforced Concrete Work (DIN 18 331)	DM.....
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1.08 - Electrical Installation Work (DIN 18 383)	DM.....
Total Cost Net for 1 Ammo Storage Igloo	DM..... =====
Total Cost Net _____ Ammo Storage Igloos	DM..... =====

Taxes and Duties

This is to certify that the prices of this bid are exclusive of any taxes and duties which the United States Government is exempted from in virtue of its agreements with the contractor's government.

The following taxes and duties are not included in the bid prices:

<u>DESIGNATION OF TAX</u>	<u>PERCENTAGE</u>	<u>AMOUNT</u>
Value Added Tax	12%	DM.....

(Location, Date)

The Bidder:
(Stamp and Legal Signature)

Storage Igloo, Earth Covered
Type 16 (80 Feet)

0.4/1

0.4

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GENERAL AND TECHNICAL PREFACE

=====

1. Location of Construction Site

The location of the Munition Storage Igloo site is indicated in the related sitework specification and shown on the sitework plans.

2. Construction Services

All services include supply of all necessary material, loading off and storage at the construction site, providing all equipment, machines, form work, scaffolding, all incidental works and deliveries.

For the execution of the construction services VOB, Part B and Part C are valid as well as the latest editions of the referenced DIN's.

With the data given in the specification on construction type, construction parts, construction materials and dimensions, also the construction and construction sequence up to the final product, based on accepted technical rules and governmental laws and criteria is considered to be specified including furnishing of materials. Thereby, type of construction means the construction by assembling materials and components to a complete work.

3. Type and Quality Designation

If makes are mentioned under the items, same will serve to determine the type and, occasionally, to determine the quality, too. It is up to the contractor to provide other equal type and quality products, however he has to furnish a related proof. In case of doubt about the equivalence, the opinion of the contracting agency shall govern.

4. Discrepancies Between Plans and Specifications

If it is the opinion of the bidder that the documents contain ambiguities which may affect the price calculation, the bidder will have to notify the contracting agency in writing, by TWX or telegram prior to submission of bid and request clarification, even though this note has been otherwise indicated.

5. Soil Condition

Records of soil test performed are included in the drawing set for site work.

6. Specified Quantity Rates

The quantity rates specified have been estimated. They shall be revised by contractor for correctness prior to submission of bid.

7. Terminology

Where ever the term Construction Supervision appears, it means:

In case of direct US Construction Contracts, the "Technical representation of the Contracting Officer,"

In case of indirect contracts through the German governmental construction agency, the "Construction Supervision of the local German governmental construction agency."

1.01 - Earthwork (DIN 18 300)
=====

Preface

1. Scope of Work

The work included in this title of the specifications cover all excavation and backfill as required for the construction of the foundations of the new igloos.

The required top soil removal is covered in the related sitework specification.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest editions)

DIN 18300 - Earthwork

Supplementary Technical Requirements and Direction for Earthwork in Road construction (ZTVE-StB 76)

2.2 Compaction

Material used to fill the foundation construction pits under the igloo floor slab shall be compacted to 100% proctor density. In the case of excavation in soil class 7, the construction pit shall be backfilled with lean concrete to the same elevation as the adjacent rock under the floor slab.

2.3 Materials

Selected cohesive material only shall be permitted for both earth cover and backfilling of construction pits for igloos. The material shall be free from any organic components, as well as debris, etc. The grain size of rocks shall not exceed a weight of 4.5 kg and a length of 15 inches. The proportion of bit orders shall be minimized, placing them predominantly in the lower section of layers. Placing big rocks directly at igloo walls and on top of igloo ceiling, shall not be permitted. The rough subgrade of the cover shall be graded true to cross section, compacted, and covered with topsoil, 15 cm thick, and selected in accordance with subsequent specifications. The minimum thickness of earth cover including topsoil, 15 cm, shall be 60 cm.

Storage Igloo, Earth Covered
Type 16 (80 Feet)

1.01/2

If no cohesive soil is available or its procurement is not economical, it will be allowed to use noncohesive material.

Degree of compaction for cohesive material: 95% Std Proctor Density

Degree of compaction for noncohesive material: 100% Std Proctor Density

2.4 Soil Tests

The soil classes 3 - 5 are combined in one Item in the following specification.

The results of the soil tests are shown on appropriate drawings in site works.

In case of differences in opinion about the soil classification, the opinion of an expert from officially acknowledged agency should be obtained at the contractor's expense.

2.5 Foundation

2.5.1 The foundations are designed for an average subgrade reaction of 100 kd/m².

2.6 Instruction for Placing

No backfilling and covering of structure with fill shall be started in any case prior to completion of the entire storage igloo and dismantling of scaffoldings. Backfilling and compacting shall be performed on the two longitudinal sides at the same time. The backfill shall not be more than 0.50 m higher on one side than on the other side in any case.

2.7 Basis for Quantities

A horizontal guide level of + 0.0 (excluding topsoil) was assumed for computation of quantities.

Storage Igloo, Earth Covered
Type 16 (80 Feet)

1.01/3

1.01 - Earthwork (DIN 18 300)

=====

3. Specification

Item	Quant,	Unit,	Description,	Unit Price	Total, DM
1	290	m ³	excavate soil predominantly in soil classes 3 - 5, DIN 18 300, for excavation of bed for floor slab of ammo storage igloo including foundation to the elevations as shown on drawings and store material excavated as required for backfilling and covering the igloo on site.		
			Quantity for this item includes the working space of 30 cm, and the sloping of the excavation sides. Unusable or surplus material must be loaded and removed to a dump, furnished by the contractor and located outside of the construction site and be dumped there.		
			For 1 m ³:	.....DM	.....
2	210	m ³	of suitable backfilling material resulting from the excavation of Item 1 and from the excavation of the site work for the construction pits and the earth cover of the Igloo, to be taken and placed in layers and be compacted to a Standard Proctor density of 100%. Consider placing of drainage tiles required if necessary on exterior of igloo mills for backfilling. Price includes sloping of cover at a gradient of 1:2.		
			For 1 m ³	.....DM	<u>.....</u>

Storage Igloo, Earth Covered
Type 16 (80 Feet)

1.01/4

Item	Quant,	Unit,	Description,	Unit Price	Total, DM
			c.o.		.....
3	830	m ³	suitable cohesive soil shall be furnished, placed true to cross section in spaces for backfilling and cover and compacted to 95% Standard Proctor Density. Otherwise, same as specified under Item 2.		
			For 1 m ³:	.....DM	.....
4	320	m ²	improved subgrade below the igloo floor slab to be constructed to designed profile and to be compacted to 100% standard proctor density.		
			This item is not applicable if soil class 6 or 7 is existing.		
			For 1 m ²:	.....DM	.....
5	186	m ²	anti-capillary course below concrete floor slab shall be constructed of gravel sand mix, 15 cm average thickness, on subgrade properly compacted and compacted according to TVT-12, par 2.2, as shown on drawing. The first layer is 12 cm thick and consists of gravel, gradation 4/32 cm. The second layer (top layer) shall be 3 cm thick and consist of sand, gradation 0.06/2 mm. Proof suitability of material mix by test specimens and by test to Contracting Officer prior to delivery to site.		
			For 1 m ²:	.....DM	.....

Storage Igloo, Earth Covered
Type 16 (80 Feet)

1.01/5

Item	Quant,	Unit,	Description,	Unit Price	Total, DM
<u>Possibly Required Item (Unit Price Only)</u>					
6	5	m ³	backfill of concrete B5 shall be furnished for backfilling section below floor slab of ammo storage igloo, placed and compacted. See also paragraph 2.2 ZTV.		
			For 1 m ³:	.....DM	//////////
7	78	m	of a building drainage system composed of flexible, all-round splitted PVC-drainage pipes, Ø 100 mm, and a filter packing 40/30 cm, made from an appropriate mineral mixture, free of settleable components, to be manufactured. Location and slope according to the drawings.		
			For 1 m:	.....DM	.....
<u>Possibly Required Item (Unit Price Only)</u>					
8	90	m ³	of vertical filter bed consisting of appropriate aggregate to be constructed laterally of the outside walls of the igloo, 25 cm wide, acc to drawing.		
			For 1 m ³:	.....DM	//////////
9	900	m ²	earth cover of igloo (rough subgrade), shall be topsoiled to a thickness of 15 cm as generally provided, graded roughly, and prepared for seeding. This includes loosening of soil, collecting and leveling off soils of diameter exceeding 5 cm, and providing fine subgrade for topsoil. Prior to construction of fine subgrade, organic humus fertilizer shall be sprayed at rate of 50 gr/qm onto area topsoiled. Finished subgrade shall be tamped slightly and backfilled after topsoiling.		

Storage Igloo, Earth Covered
Type 16 (80 Feet)

1.01/6

Item	Quant,	Unit,	Description,	Unit Price	Total, DM
			Necessary longitudinal and transverse hauling from storage places of topsoil to location of placing shall be included in price.		
			For 1 m ²:	.....DM	.....
10	900	m ²	the surfaces covered with top soil, acc to Pos 9, must be expertly seeded with grass, 35 gr/qm, worked-in and rolled.		
			The mix of the grass seeds must be matched with site conditions. The seeds must be genuine to type and have the best commercial purity and germinating power. On demand of the employer, proof of these facts and the origin of the seeds must be furnished. Included in the price are: the first two grass cuts, removal of grass cut and the continuous maintenance acc to ZTVE-StB 76, until final acceptance.		
			For 1 m ²:	.....DM	.....
			Total - 1.10 - Earthwork (DIN 18 300)	 =====

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/1

1.02 - Concrete and Reinforced Concrete Work (DIN 18331)
=====

Preface

1. Scope of Work

The work included in this title of the specifications covers the concrete and reinforced concrete work for an igloo.

2. Additional Technical Requirements

2.1 Applicable Regulations (latest editions)

DIN 18331 - Concrete and Reinforced Concrete Work

2.2 Reinforcing Steel

The steel to be used shall be concrete reinforcing steel BST 420/500 (steel bars) and BSt 500/550 (welded wire fabric) according to DIN 488 specifications. The reinforcing steel must be checked and accepted in writing by the Contracting Agency before concreting. The services specified shall be regarded, unless otherwise specifically stated, as including the necessary formwork. Furnishing and placement of reinforcing steel are contained in separate items, unless otherwise specified.

2.3 Formwork

The formwork to be furnished shall meet the following requirements:

- 2.3.1 Wood forms for unexposed concrete surfaces shall be sharpened edged, rough lumber, perfectly sound and straight, at least 24 mm thick.
- 2.3.2 Wood forms for exposed concrete surfaces shall be either wood forms with plywood inner lining or plywood forms, properly braced as described hereinafter.
- 2.3.3 Plywood forms shall be commercial standard, moisture resistant concrete form plywood, five-ply, minimum thickness 14 mm.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/2

- 2.3.4 Form linings shall be commercial standard three-ply plywood, or hard-pressed fiber board, or similar material approved by FRG Contracting Agency.
 - 2.3.5 Metal forms may be used if same have surfaces approved by FRG Contracting Agency showing surfaces equal to, or better, than those specified for wood forms.
 - 2.3.6 Form oil shall be nonstaining to concrete and shall not affect physical properties of concrete.
 - 2.3.7 Form ties shall be metal, factory-fabricated, removable or snap-off, that will leave holes 12 mm to 25 mm in diameter and not less than 40 mm deep, in surfaces to be exposed, and shall not project beyond the concrete elsewhere. Holes shall be filled with cement mortar.
- 2.4 Arrangement of the Reinforcing Concrete Cover - See Reinforcing Plan
- 2.5 Joints
- 2.5.1 General

Joints must be constructed as shown on the drawings. The construction of joints as well as the sealing with a sealing compound is included under separation specification items for concrete work.
 - 2.5.2 Doweled Construction Joints in Floor Slab

Doweled construction joints shall be planned in places in the concrete slab poured on-site, as shown on the drawing. The depths of the joints shall not be less than 20 mm. The dowels, 25 mm in diameter, 50 cm long, spaced 30 cm, shall be smooth steel bars, BSt 220/340 GV, with one end coated with grease. After hardening of the concrete, the joints must be sealed with a sealing compound according to the requirements of the Federal Spec SS-S-164.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/3

2.5.3 Joint Edging

Joints shall have their edges carefully smoothed and rounded by means of an appropriate edging tool.

2.6 Air Entraining Concrete

All concrete shall have an air entraining agent added to provide 5.5% +/- 1.5% entrained air.

Only air entraining agent LP with official test certificate shall be used.

2.7 Watertight Concrete

Special attention must be paid to the purity and good granulometric composition of aggregates when producing watertight concrete used for floor slabs. Para 6.5.7.2, DIN 1045, governs the fabrication of concrete.

2.8 Lightning Protection System

During the performance of the reinforcing work, the Lightning Protection System of Title 1.07 must be installed.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/4

3. Specification

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
1	10	m ³	Concrete B5 to be placed below foundations for leveling course and compacted. Average thickness: 8 cm	
		For 1 m ³	DM . . . . .	. . . . .
2	12	m ³	Concrete B25, to be furnished for foundation beam of front wall of ammo storage igloo, placed, and compacted as shown on drawing. Concrete shall contain air entraining additive (LP). Formwork and reinforcement are reimbursed separately.	
		For 1 m ³	DM . . . . .	. . . . .
3	18	m ²	Formwork for foundation beam of front wall of ammo storage igloo to be furnished, erected, and removed.	
		For 1 m ²	DM . . . . .	. . . . .
4	875	kg	Concrete rebars BSt 420/500 (DIN 488) for cast-in-situ components under Item 2 (foundation beam) to be furnished at various diameters, cut, bent, and installed, including all concrete spacers as required.	
		For 1 kg	DM . . . . .	. . . . .
5	32	m ³	Concrete B 25 for foundations of rear wall, side walls, and revetment to be fabricated as shown on drawings. Formwork and reinforcement are reimbursed separately.	
		For 1 m ³	DM . . . . .	. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/5

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	.....
6	52	m ²	Formwork for foundations (rear walls, side walls, and revetment) to be furnished, erected, and removed.	
		For 1 m ²	DM .....	.....
7	5.585	kg	Concrete rebars BST 420/500 (DIN 488) for cast-in-situ concrete components under Item 5 (foundation of walls) to be furnished at various diameters, cut, bent, and installed including all concrete spacers as required.	
		For 1 kg	DM .....	.....
8	26	m ³	Concrete B25 for revetment and front wall of ammo storage igloo including gate frame to be furnished, placed, and compacted as shown on drawing. Concrete shall contain air entraining additive (LP). Formwork and reinforcement are reimbursed separately.	
		For 1 m ³	DM .....	.....
9	163	m ²	Formwork for rising revetments and front walls to be furnished, erected, and removed. Formwork for exposed concrete surfaces shall be in accordance with Paragraph 2.3.2, ZTV (Page 1.02/1).	
		For 1 m ²	DM .....	.....
10	3.920	kg	Concrete rebars BST 420/500 (DIN 488) for cast-in-situ concrete components under Item 8 (front wall and revetments) to be furnished at various diameters, cut, bent, and installed including all concrete spacers as required.	

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/6

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	. . . . .
11	97	m ³	Concrete B25 for rear wall, side walls and arch structure to be furnished, placed, and compacted as shown on drawing. Concrete shall contain air entraining agent (LP). Formwork and reinforcement are reimbursed separately.	
			For 1 m ³ DM . . . . .	. . . . .
12	630	m ²	Formwork for rear wall, side walls, and arch structure (interior and exterior) to be furnished, erected, and removed. Provide smooth concrete surfaces for interior and exterior surfaces to be sealed.	
			For 1 m ² DM . . . . .	. . . . .
13	16.120	kg	Concrete rebars BST 420/500 (DIN 488) for cast-in-situ concrete components under Item 11 (rear wall, side walls, and arch structure) to be furnished at various diameters, cut, bent, and installed including all spacers as required.	
			For 1 kg DM . . . . .	. . . . .
14	28	m ³	Concrete B25, waterproof concrete for floor slab, to be furnished, placed, and compacted as shown on drawing. Floor slab is 15 cm thick and has a longitudinal sloping of 0.5%. This unit price includes screeding and smoothing of concrete surface with steel trowel. Formwork and reinforcement are reimbursed separately.	
			For 1 m ³ DM . . . . .	. . . . .
			Carry Over:	. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/7

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	.....
15	1.50	m ²	Formwork for construction joints in floor slab, to be furnished, placed, and removed.	
		For 1 m ²	DM .....	.....
16	757	kg	Welded steel fabric BST 500/550 (DIN 488) to be furnished as list mats for floor slab, cut, and installed including spacers.	
		For 1 kg	DM .....	.....
17	994	kg	Welded steel fabric BST 500/550 (DIN 488) to be furnished as supporting mats for floor slabs, cut, and installed including spacers (Alternative Item - Unit Price only).	
		For 1 kg	DM	//////////
18	25	ea	Dowels, 25 mm, for construction joints in floor slabs, manufactured of concrete rebars BST 220/340 GV (DIN 488) to be furnished and installed as shown on drawing. Single length of bars: 500 mm. Provide one end with bituminous paint coat or plastic coating.	
		For 1 ea	DM .....	.....
19	23	m	Joints (construction joints) to be subsequently cut into top of floor slab, 8 mm wide, 20 mm deep, and filled with joint sealing compound to be flush with surface as shown on drawing. Joint sealing compound shall be in accordance with US Federal Specification SS-S-164.	
		For 1 m	DM .....	.....

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/8

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	.....
20	1.50	m ³	Concrete B25 for vent stack, precast concrete elements, including formwork to be provided as shown on drawing. Including discharge outlet and section to be welded to insulating foil. Concrete shall contain air entraining additive (LP). Provide smooth concrete surfaces for all surfaces. Reinforcement is reimbursed separately.	
		For 1 m ³	DM .....	.....
21	90	kg	Concrete rebars BST 420/500 (DIN 488) to be furnished for vent stack (precast concrete element) at various diameters, cut, bent, and installed, including all concrete spacers as required.	
		For 1 kg	DM .....	.....
22	1	ea	Install vent stack. This item shall include all difficulties resulting from precautions for subsequent installation of precast vent stack element at construction of rear wall and arch structure including all fasteners as required.	
		For 1 ea	DM .....	.....
			Carry Over:	.....

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/9

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	. . . . .
23	15	m	Galvanized steel conduit including 90° elbows to be furnished complete and installed in formwork for front wall (foundation and wall) as shown on drawing. Clear Diameter: Up to 2." Secure and mark buried end.	
			For 1 m	DM
24	64	m	Joint filler for providing joints in floor slab to be furnished and installed. Use bitumized wood fiber boards, 1.2 cm thick, for joint filler. Floor slab is 15 cm thick. Prior to filling of joints with bituminous joint filling compound, top 3 cm shall be removed.	
			For 1 m	DM
25	L.S.		Steel installation parts (anchor plates, angle steel frames, etc.) furnished by others to be installed line and level in formwork of concrete components.	
			LUMPSUM PRICE	DM
26	10.50	m	Construction joints to be provided in front wall between gate wall and wing wall including formwork as shown on drawing. Unit price shall also include furnishing and installation of joint plate.	
			For 1 m	DM
			Carry Over:	. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.02/10

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
			Carry Over:	. . . . .
27	2	ea	Recesses to be provided in foundation beam of gate wall for lateral gate posts, 15/15 cm, approximately 40 cm deep, as shown on drawing.	
		For 1 ea	DM . . . . .	. . . . .
Total 1.02 - Concrete and Reinforced Concrete Work (DIN 18 331)			 =====

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.03/1

1.03 - Dampproofing Work (DIN 18 337)
=====

Preface

1. Scope of Work

The work covered by this title of the specifications consists in furnishing all plant, labor, equipment supply and materials and in performing all operations in connection with the installation of dampproofing and membrane waterproofing complete, in strict accordance with the title of the specifications, the applicable drawings and in compliance with contract provisions.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest edition)

DIN 18 337 - Dampproofing against nonpressurized water

DIN 4117 - Dampproofing of buildings

Fed Specs SS-S-164 Sealing Compound

2.2 Preparation of Surfaces

Surfaces to receive dampproofing or waterproofing membrane shall be smooth, clean and dry. All holes, joints and cracks shall be pointed flush with mortar and high spots shall be ground smooth. Surfaces shall be carefully swept or dusted to remove all foreign matter. Before dampproofing is applied, surfaces to be covered shall have been inspected and approved by the FRG Contracting Agency. The costs for all preparation work are to be included in the unit price.

2.3 Samples

Prior to start of dampproofing work, the contractor has to submit samples of materials provided for performance to FRG Contracting Agency for approval without any special cost.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.03/3

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
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Carry Over:

3 420 m² Insulate surfaces of arched roof, longitudinal walls, and rear wall as shown on drawings as follows:

Dampproofing according to DIN 18 337 using thermoplastic plastic foil, 1.5 mm minimum thickness, as provided under Paragraph 2.26, DIN 18 337, to be applied continuously to entire area of all aforementioned surfaces of structure according to manufacturer's instructions.

Prove to FRG Contracting Agency that the foil to be used is in accordance with quality requirements under Paragraph 2.261, DIN 18.337, and suitable for dampproofing to be provided. Furthermore foil shall be free from pores, cracks, and blisters, as well as even, moist-proof, root-resistant, and rodent-resistant.

Ensure minimum thickness of foil at all points of dampproofing insulation. Recessed and protruding corners in sealing membrane shall be reinforced with so-called nosing of plastic foil of same type and thickness.

Price includes furnishing and installation of any sections to be welded to, as well as waterproof connections to the structure.

Data on plastic foil to be used:

Basis of raw material:
 Brand Name:
 Thickness:mm
 Tensile Strength:kp/cm²
 Ultimate Strength:%
 Temperature Resistance: from . . . to . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.03/4

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
Carry Over:				. . . . .
4	64	m	Joints in bottom to be filled flush with joint sealing compound as shown on drawing. Joint sealing compound shall conform to US Federal Specification SS-S-164.	
		For 1 m	DM . . . . .	. . . . .
Carry Over:				. . . . .
5	186	m ²	Polyethylene foil to be furnished and installed below concrete of floor slab. Foil shall not be less than 0.15 mm thick.	
			Basis of Raw Material:	
			Brand Name:	
			Thickness:	
		For 1 m ²	DM . . . . .	. . . . .
6	175	m ²	Insulating layer consisting of polystyrene filter boards, 65 mm minimum thickness, to be applied to surfaces of longitudinal walls and rear wall as directed by manufacturer.	
		For 1 m ²	DM . . . . .	. . . . .
7	245	m ²	Insulating layer consisting of foil or tissue, not less than 4 mm thick, to be applied to surface of arch structure.	
		For 1 m ²	DM . . . . .	. . . . .
Total 1.03 - Dampproofing (DIN 18 337)			 =====
Carry Over:				. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/1

1.04 - Structural Steel and Metal Work (DIN 18335/18360)
=====

Preface

1. Scope of Work

The work included in this section of the specifications cover the structural steel and metal work.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest edition)

DIN 18335 - Structural Steel Work

DIN 18360 - Metal Construction Work

DIN 18357 - Locksmith Work

2.2 Shop Priming

All items described in this paragraph, not being made of galvanized steel, must get a prime coat before delivery to the construction site.

2.3 Anchors

Anchor straps and various anchor items not already described in other sections of the specifications or shown on the drawings shall be made of flat steel 10 mm x 50 mm extending 30 cm into masonry or concrete. Bent ends shall be bent on 50 mm length. Anchors shall be spaced approximately 45 cm on centers. They shall be embedded in concrete. The use of gypsum plaster for such work is strictly forbidden.

2.4 High Security Door Hasps will be Government-furnished, Contractor-installed. Not less than 30 workdays prior to required date of delivery, the contractor shall inform FRG Contracting Agency in writing and request him to furnish the hasps for installation. Special care is required for installation to ensure that the hasps be located so that the padlocks can be provided with closed front for maximum security without interference or change. Install hasp components so that the carbide wires recessed are located opposite to each other. When procuring and installing hasps, ensure that carbide wires are not displaced or torn.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/2

3. Specification

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
------	----------	------	-----------------------------------	---------------------

1	1	ea	1-Wing sliding entrance gate for a clear door opening 3.05 x 3.05 m, including gate suspension to be furnished and installed according to drawings.	
---	---	----	---	--

1.1 - Materials and Fabrication:

Door shall be constructed, assembled, welded and equipped with all required hardware and accessories to complete the installation, in the shop of a competent, well-known manufacturer of industrial doors or other manufacturer as approved. Shop drawings shall be furnished for approval prior to fabrication. Materials and fabrication of entrance door shall be in accordance with the applicable requirements of this section and as indicated on the drawings. Door shall be made of steel plates 8.0 mm and 10 mm and steel shapes IPB 160 and U200 as shown by the details of the drawings.

1.2 - Operation:

The door shall be manually operated by chain drive. Door has to move by pulling on an endless chain with maximum 8.5 kg pull to operate the door.

1.3 - Weatherstripping:

The sliding entrance door shall be weatherstripped with rubber impregnated canvas tape as shown by the details on the drawings. Weatherstripping shall be installed in such a manner to ensure complete weathertight closure.

Continued

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/3

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
<u>1 Continued</u>				
			<u>1.4 - Installation:</u>	
			All anchoring items for nosing angles, guide rails, and other metal parts for entrance door to be concreted shall be inserted and braced prior to pouring concrete. Entrance door shall be installed perpendicularly and complete including all necessary hardware and accessories shown on drawings; all work shall be performed by skilled personnel. It must be proved prior to acceptance that the door is in proper operational condition. Door shall not be installed prior to completion of all other construction work except for painting and clean sweeping of floors.	
			For 1 ea	DM
2	1	ea	Door frame L 90/9 and L 150/90/10 for door specified under Item 1, with flat steel anchors 50 x 10 x 300 mm, to be spaced 45 cm on centers to be furnished and installed as shown on drawing.	
			For 1 ea	DM
3	1	ea	Ventilation head on top of exhaust stack, to be constructed as shown on drawing; all parts to be hot-dip galvanized and mounted after manufacture, including furnishing fastening material as required.	
			For 1 ea	DM
			Carry Over:	. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/4

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
Carry Over:				.....
4	1	ea	Damper grating for installation in exhaust stack, to be constructed as shown on drawing, individual components to be hot-dip galvanized, and installed on site. Structure consists of angle steel frame L 60/60/5 mm, grating 20/20/2 mm, welded into angle steel frame, sheet steel damper, 3 mm thick, welded to continuous shaft, exterior lever system with chain and fusible link secured in "OPEN" position, as well as exterior flashing with fastening and locking device.	
		For 1 ea	DM .....	.....
5	2	ea	Damper system for vent openings in front wall, consisting of sheet plate, 10 mm thick, welded to continuous shaft, 24 mm Ø, level with counterbalance, chain, and fusible link to be constructed and mounted as shown on drawing. Damper is fastened with two steel plates, 5 mm thick, with top welded to bearings for shaft, with interior bearing to be manufactured of brass. Provide bearing with greasing nipples. Four (4) holes for M 10 bolts are drilled into plates to be fastened to concrete wall. Damper system shall be hot-dip galvanized after completion. All items needed for fastening such as metal expansion dowels, bolts, etc. are included.	
		For 1 ea	DM .....	.....
Carry Over:				.....

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/5

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
Carry Over:				.....
6	2	ea	Security bars for clear opening of 610 x 160 mm, consisting of angle steel frame L 50/30/5 mm with round steel bars, 12 mm Ø, and flat bars, 30 x 10 mm, welded into frame, to be manufactured hot-dip galvanized, and mounted removably with metal expansion dowels on interior bunker side of vent opening as shown on drawing including all items necessary for installation.	
			For 1 ea	DM
7	2	ea	Insect screen for clear opening of 610 x 160 mm, consisting of angle steel frame L 20 x 3 mm with wire mesh insect screen installed, mesh width approximately 1.5 x 1.5 mm, to be provided hot-dip galvanized and installed removably in vent opening as shown on drawing.	
			For 1 ea	DM
8	2	ea	Security hasps to meet maximum requirements (US Government-furnished) to be adapted and installed as shown on drawings (GFCI).	
			For 1 ea	DM
9	1	ea	Anchor plate, sheet steel, 290 x 210 mm, 20 mm thick, with top welded to 4 ea flat steel anchors FL 10 x 50 mm, 350 mm long, to be provided as shown on drawing and turned over in advance to structural contractor for installation in formwork.	
			For 1 ea	DM
Carry Over:				.....

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.04/6

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
Carry Over:				. . . . .
10	2		ea Anchor plates, sheet steel, 270 x 220 mm, 10 mm thick, with 2 ea holes drilled for M 24 bolts, and 2 ea threaded rod anchors M 24 to be provided as shown on drawing, otherwise same as before.	
			For 1 ea	DM
11	1		ea Angle steel fitting L 150 x 100 x 12, 300 mm long, with 2 ea holes drilled for M 24 bolts, and 2 ea threaded rod anchors M 24, as well as flat steel anchors FL 10 x 50 x 300 mm to be provided as shown on drawing, otherwise same as specified under Item 9.	
			For 1 ea	DM
12	1		ea Anchor plate, sheet steel, 325 x 305 mm and 115 x 155 mm, 20 mm thick, with top welded to 4 ea flat steel anchors 10 x 80 mm, 380 mm long, and 1 ea flat steel anchor 10 x 50 mm, 350 mm long, to be provided as shown on drawing, otherwise same as specified under Item 9.	
			For 1 ea	DM
13	2		ea Pipes, 80 mm Ø, 400 mm long, to be installed in recesses of gate found- ation beam and backfilled with concrete as shown on drawing.	
			For 1 ea	DM
Total - 1.04 - Structural Steel and Metal Work (DIN 18 335 and 18 360)			 =====

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.05/1

1.05 - Sheet Metal Work (DIN 18339)
=====

Preface

1. Scope of Work

The work included in this title of the specifications covers the sheet metal work for the new igloos.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest edition)

DIN 18339 - Sheet Metal Work

3. Special Conditions

The work contained in this title shall be coordinated with the work for the other titles under this contract. All scaffolding as required for performing the work covered by this title shall be included in the unit prices of the pay items.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.05/2

4. Specifications

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
1	12	ea	Hot-dip galvanized brackets for weatherproof facing above the gate under Item 1, Title 1.04, to be provided and mounted as follows: Bracket consisting of angle L 40 x 6 mm, with bracing sheets as shown on drawing, including appurtenant corrosion resistant installation items such as metal expansion dowels, bolts, and holes drilled for M 6 bolts for fastening to concrete walls. Determine exact dimensions required for manufacture such as projecting lengths of brackets, front width of weatherproof facing etc. on site (in concurrence with gate manufacturer).	
		For 1 ea	DM . . . . .	. . . . .
2	1	ea	Top cover sheet for weatherproof facing, heavy galvanized sheet steel, 1.2 mm thick, to be provided with notched joints, folded up onto concrete wall by 10 cm, folded back on front side, as shown on drawing and mounted to brackets under Item 1 with tap screws. Obtain exact dimensions for cutting on site as specified under Item 1. Price includes difficulties in providing cuts, fastening items, as well as waterproof covering of fastening bolts with caps soldered to top or equal. Sheet to be cut: approximately 8.50 sqm.	
		For 1 ea	DM . . . . .	. . . . .
			Carry Over:	. . . . .

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.05/3

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
3	1	ea	Facing including sides of weatherproof facing, heavy galvanized sheet steel, 1.2 mm thick, lower end folded back, butt-joints, otherwise same as specified under Item 2. Height of facing: approx 800 mm. Sheet cut to a size of approx 7.50 mm.	
		For 1 ea	DM . . . . .	. . . . .
4	9	m	Overhang sheet, upper end with folded-up edge, to be filled with permaplastic sealing compound, shall be furnished and mounted on entire length of facing above top cover sheet specified under Item 2. Price includes: Difficulties in providing corner connections, fastening items, as well as filling top joint with permaplastic sealing compound.	
		For 1 m	DM . . . . .	. . . . .
5	2	ea	Galvanized weather protective sheets, 0.8 mm thick, approx 320 mm long, projecting by 10 cm, top folded up for filling with permaplastic joint sealing compound, to be provided and fastened to concrete wall above flaps under Item 5. Price includes filling of joints and fastening items as required.	
		For 1 ea	DM . . . . .	. . . . .
Total - 1.05 - Sheet Metal Work (DIN 18 339)			 =====

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.06/1

1.06 - Painting (DIN 18 363 and 18 364)
=====

Preface

1. Scope of Work

The work covered by this section of specifications consists of furnishing all plant, labor, equipment, appliances and materials, and in performing all operations in connection with protective painting on metals, complete, subject to terms and conditions under the contract, and in strict accordance with this title and the applicable drawings.

2. Additional Technical Requirements

2.1 Applicable Publications (latest edition)

DIN 18 363	Painter's Work
DIN 18 364	Painting on Metal
Fed Specs TT-E-489F	Enamel, Alkyd, Gloss (for exterior and interior surfaces)
TT-P86c	Paint, Red Lead Base, Ready-Mixed
TT-P-645	Primer, Paint, Zinc-Chromate, Alkyd Type

3. Colors

Paint colors shall be determined by FRG Contracting Agency.

4. General

All exterior and interior ferrous metal, except reinforcing steel, bolts and metals with nonferrous coatings, shall be provided with a shop coat of rust protective paint.

5. Quality Control Tests

Contractor shall furnish a test report showing that the proposed paint meets all Federal Specifications requirements.

6. Materials

6.1 General US END ITEM

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.06/2

6.2 Paints shall be factory manufactured and delivered to job site in unbroken containers which shall show the designated name, formula, batch number, color, manufacturer's instructions and name of manufacturer.

6.3 Job site mixed paints will not be permitted unless approved by FRG Contracting Agency.

6.4 Oil Paints US END ITEM

Oil paints shall be first grade products of well-known and recognized manufacturers. As a rule, zinc or titanium oxide with pure linseed oil as the basic element mixed with proper amounts of thinner and drier and, if necessary, pure mineral coloring pigments shall be used in preference to lead oxide. Finish shall generally be flat or satin unless a glossy finish is expressly specified for a given unit of the work. Oil-paints may be sprayed when diluted with normal thinner not to exceed 12% in volume.

6.5 Metal Protective Paints US END ITEM

Rust protective paint for either shop or field application shall be red lead or zinc chromate base. Such protection may be replaced by a baked enamel factory finish. Priming of metal surfaces which are to receive other coats of paint shall be rust protective. Rust protective paint shall be first quality.

6.6 Coloring Pigments US END ITEM

Only pure mineral pigments finely ground and with long life color characteristics shall be used in tinting paint.

6.7 Other Components

Solvents, siccative and similar components shall be of first quality and of types suited to the materials with which they are mixed, as recommended by the manufacturer.

7. Application

Surfaces to be painted shall be thoroughly cleaned according to DIN standards. Rust protective paint shall be kept well stirred while being applied. No paint shall be used after it has caked or hardened. Paint shall be well worked into all joints and corners. Metal surfaces which will be inaccessible after erection and which require a coat of protective paint shall be painted before erection of structure.

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.06/3

8. Specification

Item	Quantity	Unit	Description of Item Unit Price	Total Price (DM)
1	25	m ²	Single wing sliding entrance door, clear size 3.05 x 3.05 m, including frames and all steel parts of the door to be painted according to DIN 18 363 with one coat of rust-preventing primer conforming to Federal Specification TT-P-86c, Type II, or TT-P-645 plus two coats of alkyd enamel, Federal Specification TT-E-489F. Color as directed by FRG Contracting Agency.	
			For 1 m ²	DM
2	10	m ²	Hot-dip galvanized exterior surfaces of the ventilations covers etc., to be prepared and painted opaque. Color as directed by FRG Contracting Agency.	
			For 1 m ²	DM
3	5	m ²	Other metal parts such as cover plates, protective angles, pipes, anchors, etc., to be painted. Otherwise as specified under Item 1.	
			For 1 m ²	DM
Total - 1.06 - Painting Work (DIN 18363)			 =====

1.07/1

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.07 - Lightning Protection System (DIN 18 384)
=====

Preliminary Remarks

1. Scope of Work

Services contained in the following title include the lightning protection system for the storage igloo.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest edition)

DIN 18 384 - Lightning Protection Systems

2.2 The lightning protection system for the storage igloo includes:

- a) Counterpoise system in the earth covering
- b) Bonding of steel reinforcement of the concrete work including connecting cables as screening system (Faraday cage).
- c) The grounding ring system with the ground rods to which both systems are connected

2.2.1 Counterpoise System

There must be a clearance of at least 50 cm between the counterpoise system in the **earth cover** and the exterior walls of the igloo.

The cables of the counterpoise system have to be arranged to afford that no point of the earth surface above the building is more than 3,0 m from the counterpoise system.

The spacing between the parallel lateral conductors of the counterpoise shall not exceed 6x6 meters.

The ventilation extension above the roof shall be connected to the counterpoise system.

The bird protection guards are to be connected to the band steel conductors of the counterpoise system. They are also to be connected to one another.

2.2.2 Screening System

The storage igloo is a structure that consists of two separate building components:

- a) Floor area with reinforcing rods. The floor surface is separated into four floor slabs by means of exposed joints.
- b) Vault structure with front wall and back wall reinforcement.

The floor area is physically separated from the vault structure by means of an exterior expansion joint.

Bonding, consisting of galvanized band steel (30 x 3,5 mm), with a hole for connection at the end of the band steel, shall be provided. One end of the bonding (two for each of the floor slabs) shall be welded to the reinforcing rods. The band steel end with the hole shall extend approx. 100 mm above the concrete surface. The bonding that is to be welded to the reinforcing rods of the walls (vault structure) shall extend approx. 100 mm above the concrete surface. The connection of the exposed band steel ends with the holes has to be provided by means of a flexible bonding strap (2 ea per connection). The terminals should be insulated with "DENSOBAND" and painted with bituminous paint.

The spacing between the bonds shall be 6,0 m maximum.

The reinforcing rods of the ventilation ducts shall have no connection with the counterpoise system in the earth cover.

All metal construction elements which are tightly connected to the structure, such as safety grilles in the ventilation cover shall be connected to the counterpoise system.

Metal construction elements that are tightly connected to the structure such as sliding rail, rain protection cover sheets, steel door frames, flange for the entrance light fixture etc. and the electrical steel plate distribution panel is to be connected to the grounding ring system in accordance with the regulations.

2.2.3 Grounding Ring System

At the bottom of the slope of the earth cover, the grounding electrode system is to be installed as a ring circuit approx. 50 cm deep.

ABB Para. 9 is to be observed

1.07/3

Storage Igloo, Earth Covered
Type 16 (80 feet)

- 2.2.3.1 The counterpoise in the earth coverage is to be connected to the ground ring system at various points. The connection has to be performed with standard terminals. All band steel ends at terminal points located below ground surface shall be bend in order to avoid separation. Terminal points shall be insulated with "DENSOBAND".
- 2.2.3.2 The galvanized strip steel (coming from the screening system) run over single resp. multiple separation points (00 resp 00) at the toe of the slope to the ground ring system. The separation points shall be clearly marked. Indirect connections between the screening and the counterpoise system are not acceptable.
- 2.3 If there are lightning protection systems (generally ground ring systems of other buildings) within a distance of several meters, the ground ring system is to be connected through the separation points. Other metal structures in a corresponding distance from the storage igloo are to be connected too.
- 2.4 The total ground resistance for the lightning system of one storage igloo shall not exceed 10 Ohm. If the measurement taken exceeds 10 Ohm additional grounding devices according to the economic value are to be provided in accordance with the instruction of the contracting officer.
- 2.5 Establish and deliver lightning protection testing booklet for the storage igloo.

The booklet, format DIN A 4, filed in folder, shall contain:

Page 1

- Location (Construction site): (i.e. "Celle")
- Facility: (i.e. "BW-Storage")
- Building, Type, No.: (i.e. "Igloo Type 16")
- Description of building: (i.e. "Concrete structure, reinforced with steel rods, Heating line-without water main-without- electrical line: cable 3 x 220 V/380 V")
- Lightning protection system:

1.07/4

Storage Inqoo, Earth Covered
Type 16 (80 feet)

Manufacturer:

Year of manufacture:

Acceptance date:

Guaranteed until:

Soil Condition:

Ground water level:

Page 2

Description of the lightning protection system: (i.e. Counterpoise system, screening system, Grounding ring system, connections according to drawing").

Legend:

Page 3

Drawing of the lightning protection system with scale

Pages 4 and 5

20 vertical columns from right to left:

Numbered with test date (date/weather/temperature/soil condition)

Pages 6 and 7.
(a total of 7 double pages)

Ground resistance, established deficiencies (thunderstorm damage) test note stamp, signature, remarks

- 2.6 Only materials of best quality and standard parts are to be used. Galvanized band steel is to be delivered in rolls only, bundles will not be permitted. Materials have to be in accordance with the ABB.
- 2.7 Work on the lightning protection system within the reinforcement of the structure is to be scheduled in such a way, that the concrete construction firm is not delayed in their work performance.

1.07/5

Storage Igloo, Earth Covered
Type 16 (80 feet)

3. Sub-Division of title

The title is divided in the following sub titles:

1.071 - Counterpoise system

1.072 - Screening system

1.073 - Grounding ring system

1.074 - Lightning protection inspection booklet

1.07/6

Storage Igloo, Earth Covered
Type 16 (80 feet)

COST SUMMARY

=====

1.071 - Counterpoise System	.....DM
1.072 - Screening System	.....DM
1.073 - Grounding Ring System	.....DM
1.074 - Lightning Protection Inspection Log Book	.....DM

Total - 1.07 - Lightning
Protection System (DIN 18384).....DM

=====

1.07/7

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.071 - Counterpoise System
=====

Specification

Item	Quant.	Unit	Description	Unit Price	Total DM
1	250		m trench, 10 cm deep, to be excavated in embankment, refilled and compacted after placing of counterpoise system.		
			For 1 m:	DM	.....
2	250		m band steel, 30 x 3,5 mm, DIN 48.801, hot galvanized, to be delivered in rolls, and buried as counterpoise system in the 10 cm deep trench of the earth coverage.		
			For 1 m:	DM	.....
3	1	ea	Interception rod, Ø 16 mm, 2,5 m long, with a cast on metal tab for band steel connection, hot galvanized, to be delivered. To be placed and installed according to drawing in provided line supports on ventilation cap. The interception rod shall extrude 600 mm above the upper edge of the ventilation cap.		
			For 1 ea:	DM	.....
4	2	ea	line support with base plate with 150 mm height, with clamps for mounting of Ø 16 mm interception rod, hot galvanized, to be provided. With self tapping screws, mounted according to drawing, on ventilation cap.		
			For 1 ea:	DM	.....
c.o.:					.....

1.07/8

Storage Inqloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total, DM
5	1	ea	rod holder for Ø 16 mm interception c.o. rod, with wood screw 7 x 80 mm, hot galvanized, including expansion bolt, to be delivered. To be installed according to drawing on ventilation duct. Including drilling work and installation of interception rod.		
			For 1 ea:	DM	.....
6	1	ea	interception rod Ø 16 mm, 1,25 m long, hot galvanized, to be delivered. To be placed and installed, according to drawing, in provided rod holder on front wall. The interception rod shall extrude 600 mm above concrete top.		
			For 1 ea:	DM	.....
7	2	ea	rod holder for Ø 16 mm interception rod with wood screw 7 x 80 mm, hot galvanized, including expansion bolt, to be delivered. To be installed according to drawing on the front wall. Including drilling work and installation of interception rod.		
			For 1 ea:	DM	.....
8	2	band steel	30 x 3,5 mm, DIN 48.801, 0,5 m long, hot galvanized, to be delivered and installed as connection from the interception rod to the counterpoise line.		
			For 1 ea:	DM	.....
9	4	ea	cross pieces 60 x 60, with intermediate plate screws and nuts M 6, hot galvanized, clamp area Ø 16/30 mm, to be delivered and installed as clamp connection for interception rod with counterpoise system.		
			For 1 ea:	DM	.....
			C.O. ....		.....

1.07/9

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
10	1		ea band steel, 30 x 3,5, 5 mm, DIN 48.801, 1,2m long, hot galvanized, to be delivered and installed as connection on interception rod and counterpoise system on ventilation duct.		c.o.....
			For 1 ea:	.....DM	.....
11	28		ea galvanized cross pieces with inter- mediate plate according to DIN 48.845, for connection of counterpoise system to grounding ring system, to be delivered and installed.		
			For 1 ea:	.....DM	.....
12	3		ea galvanized cross pieces with inter- mediate plate according to DIN 48.845, for connection of counterpoise bonding pieces with the sliding rail, zinc sheet cover and door frames, to be delivered and installed.		
			For 1 ea:	.....DM	.....
13	3		ea band steel, 30 x 3,5 mm, DIN 48.801, 1 m long, connection pieces for connection to sliding rail, zinc sheet cover and door frames, with cadium screws and nuts M8, to be delivered and installed separately from the screening system, including all drilling work and connections. No connection to the screening system shall be made.		
			For 1 ea:	.....DM	.....
				c.o.:	.....

1.07/10

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				c.o.	.....
14	1	ea	NSLFF 25 mm ² , 3 m long, connection cable as flexible connection on the door frame and sliding rail to be delivered and installed. Including galvanized bonding plate 80 x 80 x 4 mm with equal counter plate galvanized screw M 10 x 60, with nut and fan pane.		
			For 1 ea:	.....DM	.....
15	40	ea	connections in the ground and where the counterpoise system exits from the ground have to be insulated with Densoband.		
			For 1 ea:	.....DM	.....
16	5	m	exposed lines shall be painted with corrosion proof paint.		
			For 1 m :	.....DM	.....
17	9	m	band steel, 30 x 3,5 mm, DIN 48.801, hot galvanized, to be delivered and installed and connected as connection for flange of exterior light fixture to grounding ring system on provided line support.		
			For 1 m:	.....DM	.....
				c.o.	.....

1.07/11

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				c.o.:	.....
18	5		ea line support with wood screw thread, 70 mm long, for flat band 30 mm, hot galvanized, with expansion bolt, to be delivered and installed according to drawing on front wall. Including drilling work and installation of band steel.		
			For 1 ea:	.....DM	.....
19	1		ea band steel, 30 x 3,5 mm, DIN 48.801,3 m long, hot galvanized, to be delivered and installed and connected as connection piece of the electrical distribution panel and grounding ring system.		
			For 1 ea:	.....DM	.....
20	3		ea line support with wood screw thread, 70 mm long, for flat band 30 mm, hot galvanized, to be delivered with expansion bolt, and installed according to drawing on front wall.		
			For 1 ea:	.....DM	.....
21	2		ea connections of band steel ends in the inspection chamber to the profile grounding rod to be provided. Including 2 ea Cu-screws M 10, DIN 933, with Cu-nuts M 10, DIN 934 and spring washer for M 10-screws, DIN 128.		
			For 1 ea:	.....DM	.....
				c.o.:	.....

1.07/12

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				C.O.:	.....
22	1	ea	connecting rope, NSLFF 25 mm ² DIN 48.801, approx. 1 m long, with two cable shoes, including Cu-screws M 8, DIN 933, Cu-nuts and spring washers for screws M 8, to be delivered. As flexible connection on safety grille in ventilation cover and on ventilation cover to be connected. Including required drilling work.		
			For 1 ea:	.....DM	.....
23	3	ea	galvanized cross piece with intermediate plate according to DIN 48.845, for connection of band steel to counterpoise system, to be delivered and installed.		
			For 1 ea:	.....DM	.....
24	2	ea	connecting ropes NSLFF, 25 mm ² , DIN 48.801, approx. 1 m long with two cable shoes, including Cu-screws M 8, DIN 933, Cu-nuts and spring washers for screws M 8, to be provided. As flexible connection between ventilation blades and band steel ends to be connected. Including all required drilling work.		
			For 1 ea:	.....DM	.....
25	1	ea	band steel 30 x 3,5 mm, DIN 48.801, 3 m long, as connection piece from ventilation blade to grounding ring system, to be installed and connected.		
			For 1 ea:	.....DM	.....
Total- 1.07/1 - Counterpoise system				 =====

1.07/13

Storage Igloo, Earth Covered
Type 16 (80feet)

1.072 - Screening System
=====

Specification

Item	Quant.	Unit	Description	Unit Price	Total DM
1	10		m band steel, 30 x 3,5 mm, DIN 48.801, hot galvanized, to be delivered in rolls and buried as connection line from screening system to grounding ring system		
			For 1 ea:	.....DM	.....
2	10		m trench, 20 cm deep, to be excavated in order to bury connection line. After placing of band steel, to be backfilled in layers and compacted.		
			For 1 m:	.....DM	.....
3	2		ea galvanized cross pieces according to DIN 48.845, with intermediate plate for connection of galvanized band steel to screening system, to be delivered and installed.		
			For 1 ea.:	.....DM	.....
4	2		ea connections of galvanized band steel to profile grounding rod shall be provided. Including 2 ea Cu-screws-M 8 x 20, Cu-nuts and fan panes for M 8- screws, to be delivered and installed.		
			For 1 ea:	.....DM	.....
5	350		m band steel, 30 x 3,5 mm, DIN 48.801, hot galvanized, to be delivered in rolls and placed as connections of reinforcing rods in the front- and back wall of the storage igloo.		
			For 1 m:	.....DM	.....
				c.o.:	.....

1.07/14

Lageriglu erdüberdeckt
Typ 16 (80 feet)

Pos.	Menge	Einheit	Leistungsbeschreibung	Einheitspreis	Gesamtpreis [DM]
Übertrag :					
6	300		Stück Kreuzstellen mit Bewehrungs- stählen mit unverzinktem Bindedraht, Ø 1,5 mm, rödeln.		
			Für 1 Stück :	.....DM	.....
7	50		Stück Kreuzstücke nach DIN 48.845, unverzinkt, mit Zwischenplatte zum Zusammenschluß der Mattenbewehrung mit unverzinktem Bandstahl liefern und montieren.		
			Für 1 Stück :	.....DM	.....
7 a			<u>Alternativ</u> : nur Einheitspreis Stück Elektro-Schweißverbindungen unter Vorhalten eines Schweißge- rätes und Lieferung der Elektroden herstellen.		
			Für 1 Stück :	.....DM	////////////////////
8	5		m sichtbare Leitung mit Anti- korrosivfarbe streichen.		
			Für 1 m :	.....DM	.....
9	8		Stück Verbindungen bei den Dehnungs- fugen der Bodenfläche zur Wand (Decke) einschließlich zwei Stück Bandstahl- stücke mit 10 mm-Anschlußloch her- stellen. Gemäß Zeichnung an die Be- wehrungsstäbe anschweißen. Anschleißseil, Cu 25 mm ² , 45 cm lang, mit zwei aufgelöteten Kabelschuhen, mit Cu-Schrauben M 10x25 mm, DIN 933, mit Cu-Muttern und Fächerscheiben für M 10-Schrauben liefern, je zwei Stück Anschleißseile je Verbindung fertig in- stallieren, einschließlich Bitumenan- strich.		

1.07/15

Storage Igloo, Earth Covered
Type 16(80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				C.O.:	.....
10	1		eaconnections in the ground at exit points to be insulated with Densoband.		
			For 1 ea:	.....DM	.....
			Total 1.072 - Screening System	 =====

1.07/16

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.073 - Grounding Ring System
=====

Specification

Item	Quant.	Unit	Description	Unit Price	Total DM
1	120	m	band steel, 30 x 3,5 mm, DIN 48.801, galvanized, deliver in rolls and install, 50 cm deep, in trench as grounding system, according to drawing.		
			For 1 m:	.....DM	.....
2	15	ea	galvanized cross pieces, same as in item 1, title 1.071.		
			For 1 ea:	.....DM	.....
3	2	ea	profile ground rod (cross profile) 50 x 50 x 3 mm, profile "A", 3 m long, with connection piece, DIN S 48 852, with two ea Cu-screws M 10 x 25, DIN 933, with Cu-nuts, M 10, DIN 934, with spring washer for screws M 10, DIN 128, to be delivered and installed, including connection of band steel ends of grounding ring system.		
			For 1 ea:	.....DM	.....
4	2	ea	directional signs consisting of enameled sheet metal 90 x 180 mm, with ground stake, with marking: "Pruefstelle/Test point", to be delivered and installed on inspection shaft.		
			For 1 ea:	.....DM	.....
			C.O.:	.....	.....

1.07/17

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				c.o.:	.....
5	120	m	trench, 50 cm deep, in natural soil (soil class 3-5, DIN 18 300) to be excavated backfilled and compacted after installation of band steel.		
			For 1 m:	.....DM	.....
6	15	ea	connections in ground insulated with Densoband		
			For 1 ea:	.....DM	.....
7	2	ea	connections of galvanized band steel to profile grounding rod, to be provided including delivery of 2 ea Cu-screws M 10 x 25, DIN 933, with Cu-nuts M 10, DIN 934, with spring washers for screws M 10, DIN 128.		
			For 1 ea:	.....DM	.....
8	2	ea	to construct inspection shafts for profile grounding rod according to drawing 11 with concrete pre fab elements, and completely installed with cast iron covers.		
			For 1 ea:	.....DM	.....
Total - 1.073 - Grounding Ring System				 =====

1.08/1

Storage Igloo, Earth Covered
Type 16 (80 feet)

1.08 - Electrical Installation (DIN 18 382)
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Preliminary remarks

1. Scope of Work

Services described in the following title include the provision as well as the installation and operational connection of the electrical system that is required for the ammo storage igloo.

In addition this title includes, not as separate site work, the current conductor, cable and electrical installation pertaining to the project.

2. Additional Technical Requirements

2.1 Applicable Requirements (latest edition)

DIN 18 382 Electric Wiring in Buildings

VDE 0100 Requirements for the construction of electrical facilities with nominal voltage up to 1000 V.

VDE 0100 Requirements for the construction of electrical facilities with nominal voltage of more than 1 KW.

VDE 0166/
58 Requirements for the installation of electrical systems in areas where there is danger of explosions.

Regulations and requirements of the local power supply company (EVU).

2.2 Note

Plastic cables, types NYCWY, are planned for the storage igloo.

Exterior wiring for the igloo shall be weather proof insulated. The lightning intensity is approx. 100 lux that is approx 10 ft.cd.

1.08/2

Storage Igloo, Earth Covered
Type 16 (80 feet)

3. Materials

US pre-fabricated material should be used, if possible, for the construction.

A list should be compiled, taken from the offers, recording the positions for which US products are available; however, mentioning at the same time the prices for either German as well as US products.

1.08/3

Storage Igloo, Earth Covered
Type 16 (80 feet)4. Specifications

Item	Quant.	Unit	Description	Unit price	Total DM
1	1	ea	distribution panel, steel-sheet armored, weather resistant and with several coats of paint provided, IP 55, with screw hinge cover with single boxes bolted together, intermediate flange, socket flange, cable entry flange, provided with:		
		1 ea.	PACCO- off-switch, (power circuit breaker), 1-pole, 32 A, 380 V, 50 Hz, as main switch, with terminals for back side connection, exterior switch handle.		
		1 ea	Light off-switch, 1-pole, 16A, 380 V, with terminals for back side connection, exterior switch handle.		
		2 ea	CEE-built-in receptacle, 3-pole, 6 h, 16 A, 240 V, 50 Hz, IP: splash water proof, slanted type for fastening to panel.		
		3 ea	circuit breakers 1-pole, 16 A, 380 V, type: L, selectivity class III, 6 kA,		
		1 ea	remote control relais, 110 V, CS, contact load 250 V, 16 A, 100%ED for installation with rail road yard terminals for control cable 4 mm ²		
		1 ea	overvoltage arrester 250 V, 50 Hz, nominal leakage impulse current (maximum value) 5 kA, for installation.		
		2 ea	terminal strips for supply cable up to 4 x 25 mm ² , and control cable terminal strip for the necessary connection whenever required.		
			Distribution wired for operation, with dividing wall, terminals, insulation, cable screw connections, rain proof roof according to drawing and supports to be delivered.		
			cont. Item 1		

1.08/4

Storage Igloo, Earth Covered
Type 16 (80 feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
			Item 1 cont.		
			To be installed on front wall of igloo, including cable connection and connection of grounding system. Make: "ELEK" or equal.		
			For 1 ea:	DM	.....
2	1	ea	pole lug light fixture with fluorescent lamps 2 x 40W, IP 44 cabinet, safety class I, grey enameled cabinet top, plexi glass trough in raster type, stainless steel trough knee lever lock. With mirror reflector, with series switch, Duo-switch system, starter to be delivered complete. Including connection ready for operation.		
			For 1 ea:	DM	.....
3	1	ea	wall flange for wall mounting with supports, 1 m long, suitable for pole lug light fixture, to be delivered. To be mounted on front wall above gate. Including connection of grounding system and painting.		
			For 1 ea:	DM	.....
4	8	m	PVC-pipe, Ø 21 mm, with pull wire, to be delivered. To be installed in the reinforcement of the front wall prior to pouring of concrete. Provision of outlet for connection of entrance light fixture and distribution according to drawing.		
			For 1 m:	DM	.....
			C.O.		.....

1.08/5

Storage Igloo, Earth Covered
Type 16 (80feet)

Item	Quant.	Unit	Description	Unit Price	Total DM
				c.o.	.....
5	9	m	NYM-J, 3 x 1,5 mm ² , to be delivered. To be pulled through the provided PVC conduit for entrance light fixture and connected on both ends ready for operation.		
			For 1 m:	.....DM	.....
6	23	m	hot galvanized steel conduit Pg 29 up to 36 (depending on requirement) including fastening material to be delivered. To be placed as conduit for cable distribution according to drawing and installed.		
			For 1 m:	.....DM	.....
7	5	ea	ceiling hooks,galvanized with internal thread M6, breaking load 40 kp,including expansion joints for screws up to 6 mm to be delivered. To be installed on interior igloo wall above gate according to drawing,including drilling work. (Make: Siemens Type 5 VC 2 III or equal).		
			For 1 ea:	.....DM	.....
8	36	m	cable conduit PVC NW 110,series 3, DIN 8062, including necessary sleeves and plastic coated pull wire,to be delivered. To be placed under entrance floor in three ducts,including all necessary earth work and all incidental services. The placing of cable conduits is shown on the drawing. See drawing- sheet E 1.		
			For 1 m:	.....DM	.....
Total - 1.08 - Electrical Installation				 =====