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Mortar Ammunition  
Artillery Ammunition  
Tank Ammunition

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### Mortar Ammunition

- 60 mm HE Mortar Bomb M73
- 60 mm SMK Mortar Bomb M73
- 60 mm ILLUM Mortar Bomb M67
- 60 mm HE Mortar Bomb M91
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### Artillery Ammunition

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Mortar Ammunition 60 mm

## 60 mm HE Mortar Bomb M72

### Technical Specifications

Shell length with fuse	240 - 300 mm
Shell max. diameter	60 mm
Shell mass max.	1 350 g Nominal
Explosive type	TNT
Explosive mass	220 g Nominal
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	Nominal
Ingniton cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	
Temperature range	-30° C to +50°C
Killing range, radius	10 m

### Ignition Cartridge

- 0+4 approx. 2 250 m
- Pmax 414 bara

Mass of cartridge	NA
Ignition cartridge length	61 mm
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	4.2 g

### Increment Charge

Mass of charge	NA
Number of charges	4
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	4.2 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	170 g
Detonator mass	NA
Fuse length	max. 88.2 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	26 mm
Temperature range	-30° C to +50°C

### Ballistic Data

Propeling charge	VO(m/s)	X <sub>min</sub>	X <sub>max</sub>
0	74	94	523
0+1	111	184	1 072
0+2	143	283	1 632
0+3	170	365	2 136
0+4	193	440	2 537



## 60 mm SMK Mortar Bomb M73



## Technical Specifications

Shell length with fuse	296 mm
Shell max. diameter	60 mm
Shell mass max.	1 350 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Weight of smoke charge	190 g
Tail unit material	Al-alloy
Tail unit mass	Nominal
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	UT M70P1 or equivalent
Temperature range	-30° C to +50°C
Killing range, radius	NA

## Ballistic Data

Propelling charge	$V_{0(m/s)}$	$X_{min}$	$X_{max}$	Pressure in barel (bar)
0	74	94	523	
0+1	111	184	1 072	
0+2	143	283	1 632	205
0+3	170	365	2 136	
0+4	193	440	2 537	413

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	4.2 g

## Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	approx. 4.2 g

## Fuse

Acceleration	130 000 m/s <sup>2</sup>
Muzzle safety	min. 8 m at m. vel. 68-72 m/s
Fuse mass	160 g
Detonator mass	NA
Fuse length	78 mm
Fuse connecting thread	NA
Diameter connecting on the shell	46 mm
Fuse length entering the shell	NA
Temperature range	-30° C to +50°C



Mortar Ammunition 60 mm

## 60 mm ILLUM Mortar Bomb M67

### Technical Specifications

Shell length with fuse	330 mm
Shell max. diameter	60 mm
Shell mass max.	1 270 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	Nominal
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	UT M68P1
Temperature range	-30° C to +50°C
Killing range, radius	NA

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	4.3 g

### Increment Charge

Mass of charge	NA
Number of charges	4
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	4.2 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	170 g
Detonator mass	NA
Fuse length	max. 88.2 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	26 mm
Temperature range	-30° C to +50°C

### Ballistic Data

Propelling charge	$V_0$ (m/s)	$X_{min}$	$X_{max}$	Pressure in barrel (bar)
O+1	117	200	950	
O+2	154	300	1 600	205
O+3	185		2 100	
O+4	210		2 450	413



## 60 mm HE Mortar Bomb M91



## Technical Specifications

Shell length with fuse	395 mm
Shell max. diameter	60 mm
Shell mass max.	1 350 g Nominal
Explosive type	TNT or RDX/TNT
Explosive mass	400 g Nominal
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick action M88
Temperature range	-30° C to +50°C
Killing range, radius	16 m

## Ballistic Data

When using 60 mm mortar M90

<u>Maximum range</u>	<u>Minimum range</u>
(0+6) 5 200 m	(0) 90 m

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	92.5 mm
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	6 g

## Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	8 g

## Fuse

Acceleration	500 g
Muzzle safety	min. 100 m
Fuse mass	220 g
Detonator mass	NA
Fuse length	max. 95 mm
Fuse connecting thread	M 38x2
Diameter connecting on the shell	NA
Fuse length entering the shell	24.1 to 25.1 mm
Temperature range	-30° C to +50°C



Mortar Ammunition 60 mm

## 60 mm SMK Mortar Bomb M91

### Technical Specifications

Shell length with fuse	395 mm
Shell max. diameter	60 mm
Shell mass max.	2 100 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Weight of smoke charge	300 g
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	UT M88 or equivalent
Temperature range	-30° C to +50° C
Killing range, radius	14 m

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	61 mm
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	4.2 g

### Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	approx. 3.6 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 100 m
Fuse mass	220 g
Detonator mass	NA
Fuse length	max. 95 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	NA
Fuse length entering the shell	24.1 to 25.1 mm
Temperature range	-30° C to +50° C

### Ballistic Data

When using 60 mm mortar M90		When using 60 mm mortar M57, M60L or similar	
Max. range	Min. range	Max. range	Min. range
5 200 m	90 m	2 700 m	90 m

Highest working pressure in mortar barrel 610 bar





# 60 mm ILLUM Mortar Bomb M91



## Technical Specifications

Shell length with fuse	495 mm
Shell max. diameter	60 mm
Shell mass max.	2 100 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Mass of illuminating candle	300 g
Illuminating power	3 m
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	M68P1 or similar
Temperature range	-30° C to +50° C
Killing range, radius	NA

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	4.2 g

## Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	4.2 g

## Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	170 g
Detonator mass	NA
Fuse length	max. 88.2 mm
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	26 mm
Temperature range	-30° C to +50° C

## Ballistic Data

The 60 mm M90 mortar, with the barrel length of  $L_c=1\ 200$  mm and mean chamber pressure  $P_{sr} \leq 618$  bar

The 60 mm M57 mortar with the barrel length of  $L_c=650$  mm and mean chamber pressure  $P_{sr} \leq 422$  bar; the M 60L, or similar

Max. range	Min. range	Max. range	Min. range
(0+6) 4 000 m	(0) 90 m	(0+3) 2 500 m	(0) 90 m

Speed of candle descent: 3 m/s





Mortar Ammunition 81 mm

## 81 mm HE Mortar Bomb M71

### Technical Specifications

Shell length with fuse	375 mm
Shell max. diameter	81 mm
Shell mass max.	4 100 g
Explosive type	TNT
Explosive mass	690 g
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick action UT M68P1
Temperature range	-30° C to +50° C
Killing range, radius	14 m

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	8 g

### Increment Charge

Mass of charge	NA
Number of charges	8
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	14 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	170 g
Detonator mass	NA
Fuse length	max. 88.2 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	26 mm
Temperature range	-30° C to +50° C

### Ballistic Data

Propelling charge	VO(m/s)	X <sub>min</sub>	X <sub>max</sub>	Pressure in barrel (bar)
0	73	90	520	
0+1	109	190	1 100	
0+2	143	350	1 790	
0+3	174	700	2 490	
0+4	204	1 200	3 210	
0+5	230	1 500	3 875	413
0+6	256	1 900	4 500	
0+7	277	2 300	5 000	
0+8	297	2 600	5 426	590



## 81 mm SMK Mortar Bomb M89



## Technical Specifications

Shell length with fuse	470 mm
Shell max. diameter	81 mm
Shell mass max.	4 100 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Mass of illuminating candle	630 g
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	UT M88 or equivalent
Temperature range	-30° C to +50° C
Killing range, radius	NA

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	approx. 7.6 g

## Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	13.8 g

## Fuse

Acceleration	500 g
Muzzle safety	min. 100 m
Fuse mass	220 g
Detonator mass	NA
Fuse length	max. 95 mm
Fuse connecting thread	M 38x2
Diameter connecting on the shell	NA
Fuse length entering the shell	24.1 to 25.1 mm
Temperature range	-30° C to +50° C

## Ballistic Data

When using 81 mm M89 mortar,  
MO-81-61-C mortar, L16A1 mortar or  
similar with the same barrel length

When using M89B-D mortar, MO-81-  
61-L mortar or similar with the same  
barrel length

Max. range	Min. range	Max. range	Min. range
64 000 m	150 m	6 700 m	160 m

Speed of candle descent: 3 m/s



Mortar Ammunition 81 mm

## 81 mm HE Mortar Bomb M91

### Technical Specifications

Shell length with fuse	470 mm
Shell max. diameter	81 mm
Shell mass max.	4 100 g
Explosive type	RDX/TNT
Explosive mass	850 g
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick action UT M68P1
Temperature range	-30° C to +50° C
Killing range, radius	18 m

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	approx. 130 mm
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	7.6 g

### Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	NA

### Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	170 g
Detonator mass	NA
Fuse length	max. 88.2 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	26 mm
Temperature range	-30° C to +50° C

### Ballistic Data

When using 81/82 mm mortar M69 B

Maximum range	Minimum range
(0+6) 6 700 m	(0) 160 m

Highest working pressure in mortar barrel 610 bar



# Mortar Ammunition 82 mm

## 82 mm HE Mortar Bomb M71



### Technical Specifications

Shell length with fuse	375 mm
Shell max. diameter	82 mm
Shell mass max.	4 100 g
Explosive type	TNT
Explosive mass	690 g
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Igniton cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick action UT M68P1
Temperature range	-30° C to +50°C
Killing range, radius	18 m

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	approx. 130 mm
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	7.6 g

### Increment Charge

Mass of charge	NA
Number of charges	8
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	14 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 100 m
Fuse mass	220 g
Detonator mass	NA
Fuse length	max. 95 mm
Fuse connecting thread	M 38x2
Diameter connecting on the shell	NA
Fuse length entering the shell	24.1 to 25.1 mm
Temperature range	-30° C to +50°C

### Ballistic Data

Propeling charge	VO(m/s)	X min	X max	Pressure in barrel (bar)
0	73	90	520	
0+1	109	190	1 100	
0+2	143	350	1 790	
0+3	174	700	2 490	
0+4	204	1 200	3 210	
0+5	230	1 500	3 875	413
0+6	256	1 900	4 500	
0+7	277	2 300	5 000	
0+8	297	2 600	5 426	590



Mortar Ammunition 82 mm

## 82 mm SMK Mortar Bomb M71

### Technical Specifications

Shell length with fuse	375 mm
Shell max. diameter	82 mm
Shell mass max.	4 100 g
Explosive type	TNT
Smoke filling	White Phosphorus
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ingniton cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick action UT M68P1
Temperature range	-30° C to +50° C

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	approx. 130 mm
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	7.6 g

### Increment Charge

Mass of charge	NA
Number of charges	8
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	14 g

### Fuse

Acceleration	500 g
Muzzle safety	min. 8 m
Fuse mass	220 g
Detonator mass	NA
Fuse length	max. 95 m
Fuse connecting thread	M 38x2
Diameter connecting on the shell	46 mm
Fuse length entering the shell	24.1 to 25.1 mm
Temperature range	-30° C to +50° C

### Ballistic Data

Propeling charge	VO(m/s)	X <sub>min</sub>	X <sub>max</sub>	Pressure in barrel (bar)
0	73	90	520	
0+1	109	190	1 100	
0+2	143	350	1 790	
0+3	174	700	2 490	
0+4	204	1 200	3 210	
0+5	230	1 500	3 875	413
0+6	256	1 900	4 500	
0+7	277	2 300	5 000	
0+8	297	2 600	5 426	590



## 82 mm ILLUM Mortar Bomb M67



## Technical Specifications

Shell length with fuse	410 mm
Shell max. diameter	82 mm
Shell mass max.	2 970 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Time fuse M68P1 or equivalent
Temperature range	-30° C to +50° C
Killing range, radius	NA

## Ballistic Data

Propeling charge	$VO_{(m/s)}$	$X_{min}$	$X_{max}$	Pressure in barel (bar)
O+1	130	300	1 115	
O+2	175	600	2 050	
O+3	212	1 400	2 770	
O+4	244	2 100	3 380	420

When firing in mortar of 1 115 mm to 1 200 mm barrel length

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	4.2 g

## Increment Charge

Mass of charge	NA
Number of charges	6
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	approx. 4.2 g

## Fuse

Acceleration	130 000 m/s <sup>2</sup>
Muzzle safety	min. 8 m at m. vel. 68-72 m/s
Fuse mass	160 g
Detonator mass	NA
Fuse length	78 mm
Fuse connecting thread	NA
Diameter connecting on the shell	46 mm
Fuse length entering the shell	NA
Temperature range	-30° C to +50° C



Mortar Ammunition 120 mm

## 120 mm HE Mortar Bomb M62P3

### Technical Specifications

Shell length with fuse	613 mm
Shell max. diameter	119.4 mm
Shell mass max.	1 260 g
Explosive type	TNT or Comp B
Explosive mass	Nominal (depends from type of explosive)
Shell body material	steel
Shell body mass	NA
Tail unit material	Steel, alternative Al-alloy
Tail unit mass	NA
Ingniton cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact, superquick an delay action UTU M78(AU29)
Temperature range	-46° C to +63° C
Killing range, radius (1 penetration per m <sup>2</sup> )	NA

### Ignition Cartridge

Mass of cartridge	max. 57 g
Ignition cartridge length	126 mm
Temperature range	-40° C to +50° C
Powder type	NGB
Powder mass	37 g

### Increment Charge

Mass of charge	465 g
Number of charges	6
Increment charge dimension	NA
Temperature range	-40° C to +50° C
Powder type	NGB
Powder mass / 1 piece	76 g

### Fuse

Acceleration	700 g
Muzzle safety	min. 10 m
Fuse mass	234 g
Detonator mass	NA
Fuse length	max. 105 mm
Fuse connecting thread	M 45x2Sd9
Diameter connecting on the shell	40 mm
Fuse length entering the shell	max. 39.4 mm
Temperature range	-30° C to +50° C

### Ballistic Data

Propeling charge	Max velocity (m/s)	Range (m)	Pressure (bar)
0+1	121	1 400	
0+6	297	6 050	≤ 1 030



## 120 mm SMK Mortar Bomb M64P1



## Technical Specifications

Shell length with fuse	600 mm
Shell max. diameter	120 mm
Shell mass max.	12 400 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Weight of smoke charge (WP)	2 450 g
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact superquick action UT M70P1 or equivalent
Temperature range	-30° C to +50° C
Killing range, radius	NA

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass	36 g

## Increment Charge

Mass of charge	NA
Number of charges	5
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	approx. 24 g

## Fuse

Acceleration	130 000 m/s <sup>2</sup>
Muzzle safety	min. 8 m at m. vel. 68-72 m/s
Fuse mass	160 g
Detonator mass	NA
Fuse length	78 mm
Fuse connecting thread	NA
Diameter connecting on the shell	NA
Fuse length entering the shell	NA
Temperature range	-30° C to +50° C

## Ballistic Data

Propelling charge	VO(m/s)	X min	X max	Pressure in barrel (bar)
O+1	123	255	1 410	
O+2	165	435	2 375	
O+3	204	625	3 400	
O+4	240	810	4 400	
O+5	271	970	5 250	
O+6	302	1 100	6 010	960

When firing in mortar of 1 115 mm to 1 200 mm barrel length





Mortar Ammunition 120 mm

## 120 mm ILLUM Mortar Bomb M84

### Technical Specifications

Shell length with fuse	670 mm
Shell max. diameter	120 mm
Shell mass max.	10 350 g
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ingniton cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder, Ballistite type
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Time fuse M84 or equivalent
Temperature range	-30° C to +50°C
Killing range, radius	NA

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass	approx. 36 g

### Increment Charge

Mass of charge	NA
Number of charges	5
Increment charge dimension	NA
Temperature range	-30° C to +50°C
Powder type	NGB
Powder mass / 1 piece	24 g

### Fuse

Fuse arming	Rotation 12 000 min <sup>-1</sup>
Acceleration	NA
Muzzle safety	min. 40 m
Fuse mass	350 g
Detonator mass	NA
Fuse length	approx. 100 mm
Fuse connecting thread	M 33x2 5h 6h
Diameter connecting on the shell	NA
Fuse length entering the shell	max. 35.6 mm
Temperature range	-30° C to +50°C

### Ballistic Data

Propeling charge	VO <sub>(m/s)</sub>	X <sub>min</sub>	X <sub>max</sub>	Pressure in barrel (bar)
O+1	137	230	1 260	
O+2	185	900	2 560	
O+3	229	1 300	3 850	
O+4	266	1 700	4 850	440
O+5	303	20 000	5 850	570



## 120 mm HE Mortar Bomb M15 LR



## Technical Specifications

Shell length with fuse	816 mm
Shell max. diameter	120 mm
Shell mass max.	14 750 g
Explosive type	TNT or Comp B
Explosive mass	Nominal (depends from type of explosive), 2.9 kg for TNT
Shell body material	steel
Shell body mass	NA
Tail unit material	Al-alloy
Tail unit mass	NA
Ignition cartridge powder	NGB
Increment charge	NGB
Propelling charge characteristics	NG powder
Cartridge case characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Gun primer characteristics	NOT APPLICABLE FOR MORTAR AMMUNITION
Fuse type	Impact superquick ac- tion UT M78 (AU-29)
Temperature range	-30° C to +50° C
Killing range, radius (1 penetration per m <sup>2</sup> )	23 m

## Ballistic Data

When using 120 mm mortar with long barrel (1 800 mm)

Maximum range	Minimum range
8 250 m	400 m

Highest working pressure in mortar barrel < 1 350 bara

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-46° C to +63° C
Powder type	NGB
Powder mass	27 g

## Increment Charge

Mass of charge	NA
Number of charges	7
Increment charge dimension	NA
Temperature range	-46° C to +63° C
Powder type	NGB
Powder mass / 1 piece	approx. 95 g

## Fuse

Acceleration	700 g
Muzzle safety	min. 10 m
Fuse mass	430 g
Detonator mass	NA
Fuse length	max. 105 mm
Fuse connecting thread	NA
Diameter connecting on the shell	NA
Temperature range	-46° C to +63° C



Mortar Ammunition 120 mm

## 120 mm SMK Mortar Bomb M15 LR

### Technical Specifications

Length of mortar bomb with fuse	826 mm
Weight of mortar bomb with fuse	14.75 kg nominal
Main charge	White phosphorous
Fuse	Superquic/delay action fuse AU-29
Arming distance at lowest muzzle velocity	50 m
Propelling charge	0+7
Temperature range	-30° C to +50°C

### Ballistic Data

When using 120 mm mortar with long barrel (1 800 mm)

Maximum range	Minimum range
8 250 m	400 m

Highest working pressure in mortar barrel <1 350 bara



Mortar Ammunition 120 mm

## 120 mm HE Mortar Bomb M15 LR



### Technical Specifications

Type	Illuminating
Total length with fuse	817 mm
Shell mass	13.5 kg nominal
Fuse	mechanical-electronic time fuse
Propelling charges	NG powder, ballistite type
Temperature range	-30° C to +50° C
Propelling charge	0+7

### Ballistic Data

Range

7 500 m



Artillery Ammunition 105 mm

## 105 mm HE Cartridge M1

### Technical Specifications

Length of complete round	790 mm
Weight of complete round	18.15 kg
Projectile max. diameter	105 mm
Projectile mass max.	13.5 kg nominal
Explosive type	TNT
Explosive mass	2.09 kg nominal
Supplementary charge consists of TNT pressed into an aluminium liner. The entire unit is placed in the fuse cavity.	
Projectile body material	steel
Projectile body mass	NA
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NG powder, consisting of 7 propelling charge increments.
Cartridge case characteristics	brass/stell
Gun primer characteristics	M28B2 type
Point detonating fuse, type M557 with choice of superquick or delay action	
Temperature range	-40° C to +52° C
Killing range, radius	18 m

### Ballistic Data

Propelling charge	Muzzle velocity Vo (m/s)	Maximum pressure (bar)	Range (m)
Howitzer 105 mm	491	2 300	11 620
M56, M18/61, M2A1, M4	472	2 200	11 275

For 7th charge

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-40° C to +52° C
Powder type	NC
Propelling charge increments	7
Powder mass	approx. 1.3 kg

### Increment Charge

Mass of charge	NA
Number of charges	5
Increment charge dimension	NA
Temperature range	-30° C to +50° C
Powder type	NGB
Powder mass / 1 piece	24 g

### Fuse

Fuse arming	Rotation 12 000 min <sup>-1</sup>
Acceleration	NA
Muzzle safety	min. 40 m
Fuse mass	350 g
Detonator mass	NA
Fuse length	approx. 100 mm
Fuse connecting thread	M 33x2 5h 6h
Diameter connecting on the shell	NA
Fuse length entering the shell	max. 35.6 mm
Temperature range	-30° C to +50° C





# 105 mm round with SMK shell M60/Semi-fixed



## Technical Specifications

Length of complete round	790 mm
Weight of complete round	20.049 kg
Projectile type	smoke
Projectile max. diameter	105 mm
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Booster (type explosive)	TNT or RDX
Mass of explosive in booster	95 g
Main charge	white phosphorus
Mass of main charge	1 842 g
Projectile body material	steel
Projectile body mass	12 968 g
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NG powder
Weight of propelling charge	1 300 g
Cartridge case characteristics	brass/stell
Gun primer characteristics	M28A1 type
Point detonating fuse, type M557 with choice of superquick or delay action	
Temperature range	-40° C to +52° C
Killing range, radius	No blast or fragmentation effects

## Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	NA
Temperature range	-46° C to +63° C
Powder type	NGB
Powder mass	27 g

## Increment Charge

Mass of charge	NA
Number of charges	7
Increment charge dimension	NA
Temperature range	-46° C to +63° C
Powder type	NGB
Powder mass / 1 piece	approx. 95 g

## Fuse

Acceleration	700 g
Muzzle safety	min. 10 m
Fuse mass	430 g
Detonator mass	NA
Fuse length	max. 105 mm
Fuse connecting thread	NA
Diameter connecting on the shell	NA
Temperature range	-46° C to +63° C

## Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Range (m)
491	2 300	11 620



Artillery Ammunition 105 mm

## 105 mm round with ILLUM shell M314A3

### Technical Specifications

Type	Illuminating
Shell weight	14.6 kd
Weight of complete round	18.6 kg nominal
propelling charge	M1
Weight of propelling charge	13 kg nominal
Illuminating range	min. 400 m
Flare intensity	400 000 - 450 000 cd
Flare burning time	up to 60 s
Falling speed	5 m/s
Cartridge case	M14
Cartridge case length	372 mm
Gun primer	M28A1
Fuse	MTSQ M577 or equivalent in function

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Range (m)
494	2 200	11 500

For Howitzer M56



Artillery Ammunition 122 mm  
**122 mm HE TF-462**



### Technical Specifications

Length of projectile	785 mm
Weight of complete round	27 kg
Projectile type	HE
Projectile max. diameter	122 mm
Explosive type	TNT
Explosive mass	3 530 g
Booster (type explosive)	TNT or RDX
Projectile body material	steel
Projectile body mass	17 800 g
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NC powder
Weight of propelling charge	2 200 g
Cartridge case characteristics	brass/stell
Gun primer characteristics	TK M71
Fuse type	UTIU M72B1
Temperature range	-30° C to +50° C
Killing range, radius	24 m

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Range (m)
565	2 450	12 840

### Ignition Cartridge

Mass of cartridge	3 600 g
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NC
Propelling charge increments	4
Powder mass	3 600 g

### Increment Charge

Mass of charge	NA
Number of charges	NA
Increment charge dimension	NA
Temperature range	NA
Powder type	NA
Powder mass / 1 piece	NA

### Fuse

Acceleration	min. 24 000 m/s
Muzzle safety distance	min. 10 m
Fuse mass	420 g
Fuse length	max. 105.7 mm
Fuse connecting thread	sp 36.14x2.54
Diameter connecting on the shell	40.8 mm
Fuse length entering the shell	max. 46.8 mm
Temperature range	-30° C to +50° C





Artillery Ammunition 122 mm

## 122 mm SMK M88

### Technical Specifications

Length of projectile	600 mm
Weight of complete round	21.9 kg
Projectile type	smoke
Projectile max. diameter	122 mm
Explosive type	WITHOUT EXPLOSIVE
Explosive mass	WITHOUT EXPLOSIVE
Projectile body material	steel
Projectile body mass	17 578 g nominal
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ingniton cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NC powder
Cartridge case characteristics	brass/steel
Gun primer characteristics	TK M71
Fuse type	UTIU M72B1
Temperature range	-30° C to +50° C
Killing range, radius	No fragment effects

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Range (m)
735	3 000	17 300



Artillery Ammunition 122 mm

122 mm HE M76



### Technical Specifications

Type	HE
Filling	TNT
Length of projectile, fused	600 mm
Weight of projectile	21.8 kg nominal
Fuse superquick/delay action	AU-18
Gun primer	TK M71

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Range (m)
565	2 450	12 840



Artillery Ammunition 155 mm

## 155 mm HE M107

### Technical Specifications

Length without fuse	655 mm
Weight of complete round	40.8 - 42.9 kg
Projectile type	HE
Projectile max. diameter	122 mm
Explosive type	TNT or COMP B
Explosive mass	6.27 kg (TNT)
Booster (type explosive)	TNT or RDX
Projectile body material	steel
Projectile body mass	approx. 35 kg
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ingniton cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	Type M3A1 (for firing zones 1 to 5) or Type M4A2 (for firing zones 3 to 7)
Cartridge case characteristics	brass/stell
Gun primer characteristics	MK2A4 primer for M1, M1A1 guns or M82 primer for M45, M126, M126A1, M185 and M199 guns

Fuse is point detonating type M557 with a choice of superquick or delay action

Temperature range	-30° C to +50° C
Killing range, radius	28 m

### Ignition Cartridge

Mass of cartridge	approx. 2 680 g
Ignition cartridge length	NA
Temperature range	-30° C to +50° C
Powder type	NC
Propelling charge increments	5
Powder mass	2 680 g

### Increment Charge

Mass of charge	NA
Number of charges	NA
Increment charge dimension	NA
Temperature range	NA
Powder type	NA
Powder mass / 1 piece	NA

### Fuse

Acceleration	10 000 m/s
Muzzle safety distance	min. 33 m
Fuse mass	900 g
Fuse lenght	max. 152 mm
Fuse connecting thread	2" x1/12"UNS-1
Diameter connecting on the shell	61.26 mm
Fuse lenght enetring the shell	max. 56.13 mm
Temperature range	-40° C to +50° C

### Ballistic Data

Gun	Charge	Muzzle velocity (m/s)	Max. range (m)
M1A1	1, M3A1	2073	3 900
M45	7, M4A2	563.9	14 600
M126	1, M3A1	2073	3 900
M126A1	7, M4A2	211.8	14 600
M185	8, M119A1	684.3	4 000
M199	8, M119A1	684.3	18 100



Artillery Ammunition 155 mm

## 155 mm SMK M110A2



### Technical Specifications

Total length of projectile	605 mm
White phosphorous filling weight	7 kg
Total weight, fused	44.6 kg
Propelling charges	M3A1, M4A2 or M119A1
Fuse type	PD M557
Primer	M82

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Max. Range (m)
574	279	14 800

Smoke cloud distance from point of origin up to 50 m

Smoke cloud length up to 300 m

Operating temperature range -40° C to +55° C



Tank Ammunition 125 mm

## 125 mm HE M86P1

### Technical Specifications

Length of shell body	676 mm
Shell weight	230 kg
Projectile max. diameter	125 mm
Explosive type	TNT
Explosive mass	3.148 kg nominal
Projectile body material	steel
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NG powder, mass 5.9 kg
Weight of cartridge case	885 g
Length of cartridge case	408 mm
Gun primer characteristics	KT-EU M84
Fuse type	UTIU, M85
Temperature range	-30° C to +50° C
Killing range, radius	28 m

### Ballistic Data

Calibre	Muzzle velocity Vo (m/s)	Maximum pressure (bar)	Range (m)
125 mm	850	3 432	12 200

### Ignition Cartridge

Mass of cartridge	NA
Ignition cartridge length	406 - 408 mm
Temperature range	-30° C to +50° C
Powder type	NC
Propelling charge increments	NA
Powder mass	2.2 - 2.9 kg

### Increment Charge

Mass of charge	NA
Number of charges	NA
Increment charge dimension	NA
Temperature range	NA
Powder type	NA
Powder mass / 1 piece	NA

### Fuse

Acceleration	3 000 g
Muzzle safety	min. 10 m
Fuse mass	460 g
Fuse length	max. 105.7 mm
Fuse connecting thread	SpW 36.22x2.54
Diameter connecting on the shell	NA
Fuse length entering the shell	max. 46.8 mm
Temperature range	-30° C to +50° C





## 125 mm round with HEAT shell M88



## Technical Specifications

Shell length with fuse	676 mm
Shell weight	1 182 g
Shell type	HEAT
Projectile max. diameter	125 mm
Explosive type	fleg-RDX
Explosive mass	1.76 kg (TNT)
Shell body material	steel
Shell body mass	NA
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NG powder
Weight of propelling charge	5 660 g
Cartridge case characteristics	NA
Gun primer characteristics	KT-EU, M84
Fuse type	UTIU, M87
Temperature range	-40° C to +55° C
Killing range, radius	NA

## Ballistic Data

Calibre	Muzzle velocity V <sub>0</sub> (m/s)	Maximum pressure (bar)	Range (m)
125 mm	905	2 900	4 000

## Ignition Cartridge

Mass of cartridge	5.9 kg
Ignition cartridge length	405 mm
Temperature range	-40° C to +55° C
Powder type	NC
Propelling charge increments	NA
Powder mass	9.5 kg

## Increment Charge

Mass of charge	NA
Number of charges	NA
Increment charge dimension	NA
Temperature range	NA
Powder type	NA
Powder mass / 1 piece	NA

## Fuse

UT-PE, M87 is piezoelectric fuse of superquick action	
Acceleration	25 000 m/s
Muzzle safety distance	2.5 mm
Fuse mass	Pierzogenerator: 85 g Bottom part: 170 g
Fuse length	Pierzogenerator: 102.36 to 104.96 mm Bottom part: 111.7 to 113.6 mm
Fuse connecting thread	Pierzogenerator: Th. M42x1.5-cl.2a left Bottom part: Ø35.3
Diameter connecting on the shell	NA
Fuse length entering the shell	NA
Temperature range	-30° C to +50° C



Tank Ammunition 125 mm

## 125 mm round with KE shell M88

### Technical Specifications

Shell length with fuse	590 mm
Shell weight	5 800 g
Shell type	APFSDS-T
Shell weight with increment charge	10 kg
Projectile max. diameter	125 mm
Explosive type	NA
Explosive mass	NA
Shell body material	steel, tungsten
Shell body mass	NA
Tail unit material	NOT APPLICABLE FOR ARTILLERY AMMUNITION
Tail unit mass	NOT APPLICABLE FOR MORTAR AMMUNITION
Ignition cartridge powder	NA
Increment charge	NA
Propelling charge characteristics	NC powder
Weight of propelling charge	5 900 g
Cartridge case characteristics	NA
Gun primer characteristics	KT-EU, M84
Fuse type	UT-PE, M87 (V-15) or similar
Temperature range	-30° C to +50° C
Killing range, radius	NA

### Ballistic Data

Calibre	Muzzle velocity $V_0$ (m/s)	Maximum pressure (bar)
125 mm	1 785	4 440

### Ignition Cartridge

Mass of cartridge	5.9 kg
Ignition cartridge length	406 - 408 mm
Temperature range	-40° C to +55° C
Powder type	NC
Propelling charge increments	NA
Powder mass	5 000 g

### Increment Charge

Mass of charge	NA
Number of charges	NA
Increment charge dimension	NA
Temperature range	NA
Powder type	NA
Powder mass / 1 piece	NA

### Fuse

UT-PE, M87 is piezoelectric fuse of superquick action	
Acceleration	25 000 m/s
Muzzle safety distance	2.5 mm
Fuse mass	Pierzogenerator: 85 g Bottom part: 70 g
Fuse length	Pierzogenerator: 102.36 to 104.96 mm Bottom part: 111.7 to 113.6 mm
Fuse connecting thread	Pierzogenerator: Th. M42x1.5-cl.2a left Bottom part: Ø35.3
Diameter connecting on the shell	NA
Fuse length entering the shell	NA
Temperature range	-30° C to +50° C



Tank Ammunition 125 mm

## 125 mm HE M86P1 Practice



### Technical Specifications

Shell mass	23 kg
Explosive charge	TNT
Weight of explosive charge	200 g
Fuse type	UTIU, M85
Shell body length (with fuse)	676 mm
Weight of propelling charge	5 kg
Weight of cartridge case	885 g
Length of cartridge case	408 mm
Gun primer	KT-EU, M84 of GUW-7

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Max. Range (m)
850	3 432	12 200

Accuracy at 1 000 m < 0.5 m

For gun D81 (2A46) on tank T72 and M84





Tank Ammunition 125 mm

## 125 mm HEAT M88 Practice

### Technical Specifications

Calibre	125 mm
Shell mass	11 820 g
Shell body length (+ dummy fuse)	676 mm
Weight of propelling charge	5 660 g
Weight of cartridge case	3 400 g
Length of cartridge case	140 mm

### Purpose

The training round with HEAT projectile is intended for training tank crews in firing from tanks provided with 125 mm guns to targets located at a distance of up to 2 500 m.

### Ballistic Data

Muzzle velocity (m/s)	Maximum pressure (bar)	Max. Range (m)
905	2 900	4 000

Temperature range: -30° C to +50° C

For gun D81 (2A46) on tank T72 and M84



Tank Ammunition 125 mm

## 125 mm APFSDS M88 Practice



### Technical Specifications

Calibre	125 mm
Shell mass with increment charge	10 kg
Shell mass	5.8 kg
Primer	KT-EU, M84
Fuse type	UT-PE, M87 (V-15) or similar

### Purpose

The training round with APFSDS-T projectile for gun 125 mm is intended for effective realistic training of tank crews in firing at a distance of up to 2 000 m.

### Ballistic Data

Muzzle velocity (m/s)	Max. range (m)	Accuracy (m)
1 785	4 000	at 1 000 m distance < 0.3 at 2 000 m distance < 0.5

Projectile flight range at barrel elevation angle  $\alpha = 10^\circ < 7\,000$  m

For gun D81 (2A46) on tank T72 and M84



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