

THALES BELGIUM

VTS/BSAA
2.75 "/70mm Rocket System

March 2019

THALES BELGIUM



■ A local presence for over 50 years

■ 6 sites across Belgium :

- Thales has served the Belgian defense, security, space and transportation markets for more than 50 years. Today the Group employs more than 800 people at six sites across Belgium, in Brussels, Charleroi, Genk, Herstal, Leuven and Tubize.
 - Thales Belgium site in Tubize
 - Thales Belgium site in Brussels serving the European institutions
 - Thales Alenia Space sites in Leuven and Charleroi
 - Thales Belgium site in Herstal
 - AvioVision site in Genk

Thales Belgium - Activities across 4 different BU

Defence

- Long-standing provider of C4I solutions to the Belgian armed forces
- Programme partner on NATO's AWACS aircraft upgrade programme for more than 20 years
- **70 mm FZ rockets in service with more than 30 countries**

Security

- Communications security for several government departments
- New paging system for ASTRID emergency services network

Space

- Thales Alenia Space on-board electronics for Ariane 5 and range safety systems for Ariane 6 and Soyuz

Transportation

- Thales train management system for lines L1/5 and L2/6 of the Brussels metro and passenger information system for the STIB/ MIVB tram network in Brussels
- Supply and 10-year maintenance contract for integrated communication systems to provide real-time passenger information on Brussels transport network
- Aerospace
- Thales radars and navigational aids (navaids) for all Belgian airports

Cybersecurity

- Cyberlab

TBE in Belgium

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2015 All rights reserved.



Thales differentiators

■ The only OEM to produce a complete rocket system : mastering whole rocket system , ammunition (fuze, warhead & rocket motor), rocket launcher, firing control system, ILS and integration

- Rocket system qualified on > 20 different platforms (AH, LH, HAL, BAe, ...)
- Under development and integration: SAL-LGR FZ275

■ Customer base : MoD + aircraft OEM + Partners

- Worldwide footprint: 25 active customers and end-users portfolio
- More than 400 helicopters + fixed wing aircraft (AH, LH, HAL, BAe, ...)
- Reference supplier for Tiger H/C community & other combat A/C

■ Thales Belgium, the flexibility of SME (Small Medium Enterprise) with the support of Thales Group (>63,000 FTE)

- Belonging 30 years to Thales Group benefiting from expertise, worldwide network and footprint

Thales differentiators

■ Direct Commercial sales (>< Foreign Military Sales – US FMS) :

- Direct contract with customer (B-to-G or B2B)
- No involvement of Belgium government (except export license)
- Flexibility

■ Full control as Design Authority

- From development to in-service
- In production > 50 years : since 1960s, focus on rocket system product portfolio
- ISO 9001

■ Open to customized solutions

- Development and adaptation to specific requirements or environments of our Customers
- Delivery: complete rocket (AUR) or separate with 'specific' marking, packaging

■ Acceptance

- For NATO countries, GQAR can be delegated to Belgian Army representative

Key facts & figures : TBE (Herstal) by the numbers

- As European centre of excellence recognized throughout the world, the only company in the world capable of mastering the whole air-to-ground rocket system 70mm (2.75")
- More than **8** million rockets produced and supplied to 55 countries and 70 armies
- in the last 5 years, TBE rocket system has been equipped worldwide on more than **400** different helicopters and aircraft
- more than **25** active international customers
- Qualified or adopted on more than **20** different platforms
- More than **50** years of experience in propulsion, pyrotechnics, mechanics, electronics, composite material, ballistics, guidance and simulation
- Small but smart : **70** highly skilled employees working together towards a shared set of values
- Supported by Thales Group worldwide

Key facts & figures : TBE (Herstal) by the numbers

- > 50% of the turnover accounted for by the NATO countries (Germany, France, Italy, Spain, Norway, UK)
- The balance of the turnover is exported worldwide (Australia, India, Asia, South-Africa, South America...)
- Systems adapted to:
 - Hawk 100-200, F-5, F-16, F/A-18, MB339, PC7, PC9,...
 - Tiger (ARH – UHT – HAD), Rooivalk, H125M, H135M, H225M, H215M, BO105, BK117, Black Hawk, A109, AW101, Bell 205, ...



VTS – BSAA Product Portfolio

Weapon management system

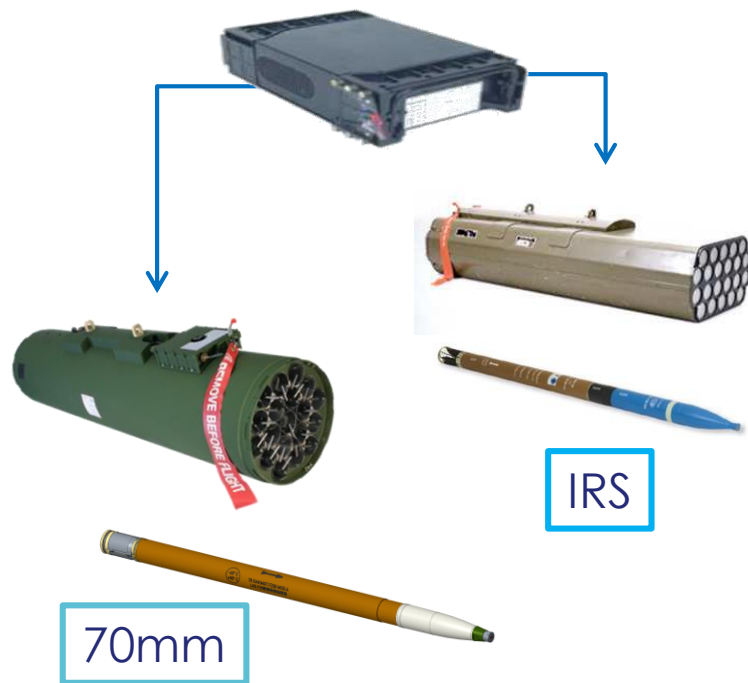
- Weapon Management Unit:
 - BHIR, GRMU, WMU, LIU

Launcher Family

- 70mm (2,75"):
 - FZ225 – 19 rounds / FZ231 – 12 rounds / FZ233 – 7 rounds
- Induction Rocket System (IRS)
 - TELSON™ 22 – 12 – 8 – 2 rounds.

Ammunition

- 70mm
 - Unguided rocket with different terminal effects (High explosive point detonating, flash, inert & darts)
 - Laser guided rocket : FZ275 LGR
- IRS
 - Unguided rocket with different terminal effects (High Explosive Airburst/Point detonating, Fum, inert & darts)
 - Laser Guided rocket : ACULEUS™ LG



Integration on various type of platforms (aircraft, helicopter, vehicle, drone)

THALES

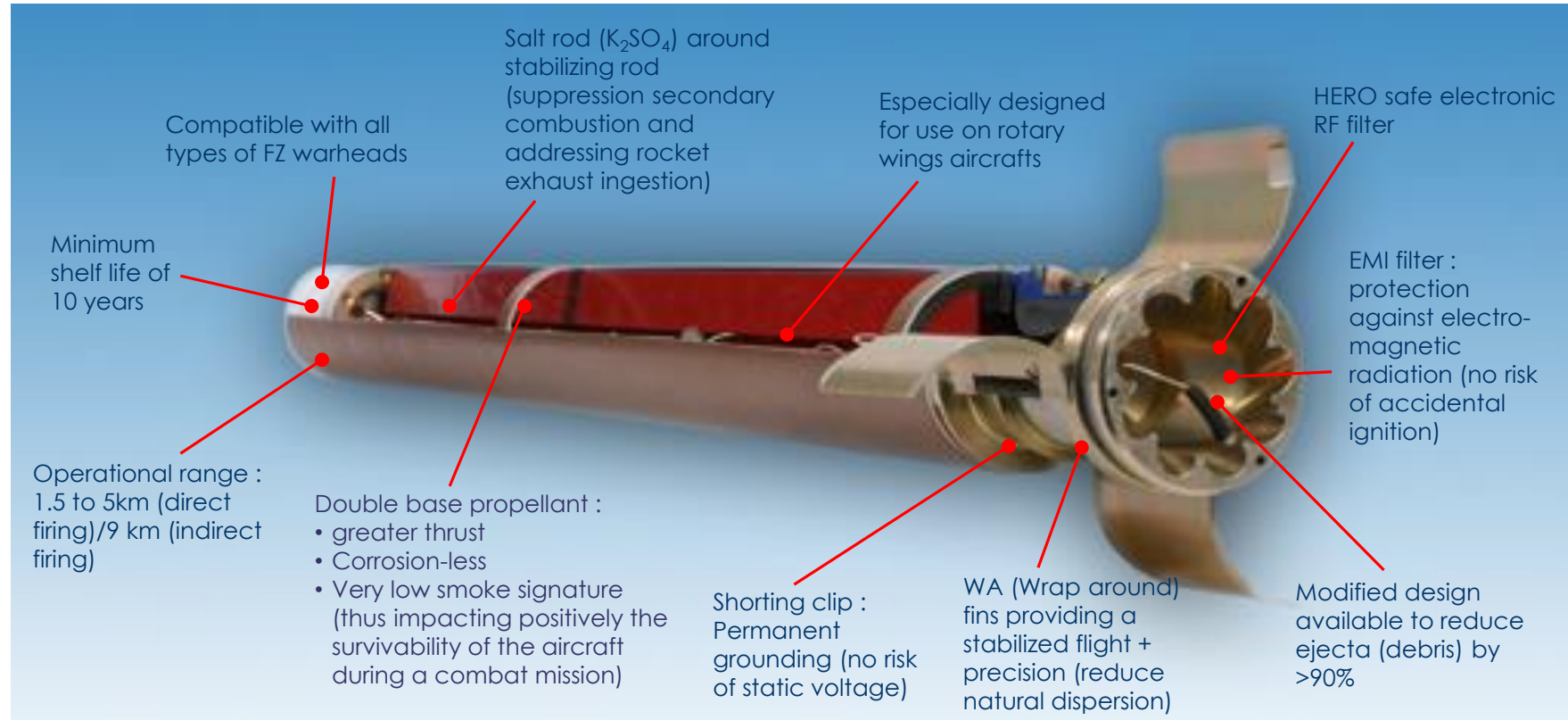
THALES

THALES BELGIUM

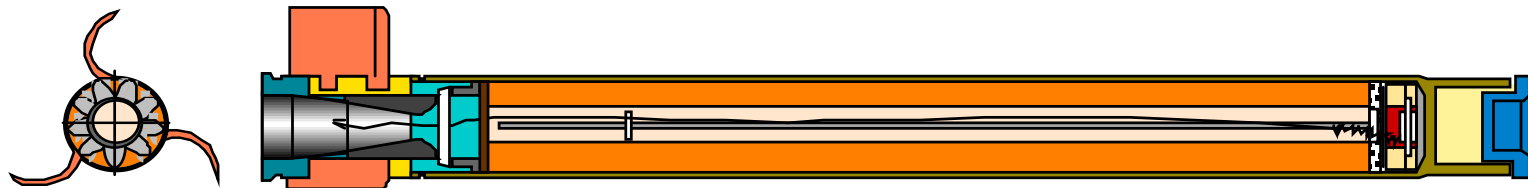
VTS/BSAA
PRODUCT PORTFOLIO 2,75 " / 70MM



WA (wrap around) Rocket motor : FZ90 MOD.2/S



Rocket motor FZ90 MOD.2/S

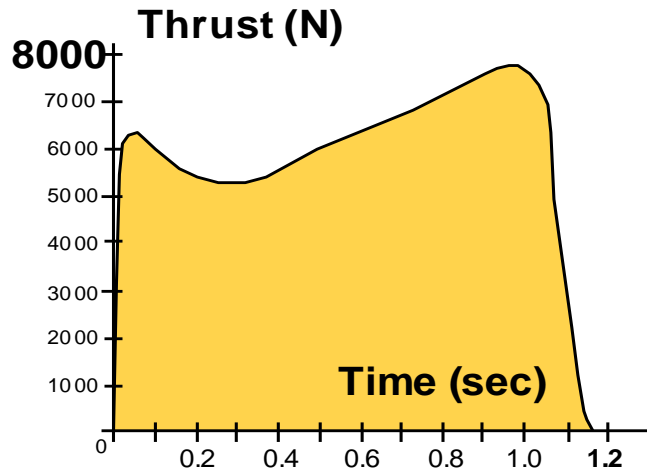


Total mass	6.3 kg
Mass of propellant grain	3.2 kg
Total impulse (at 21°C)	680 daN.s
Range (ground-to-ground)	9,100 m
Nozzle & fin assy	3 wrap around fins

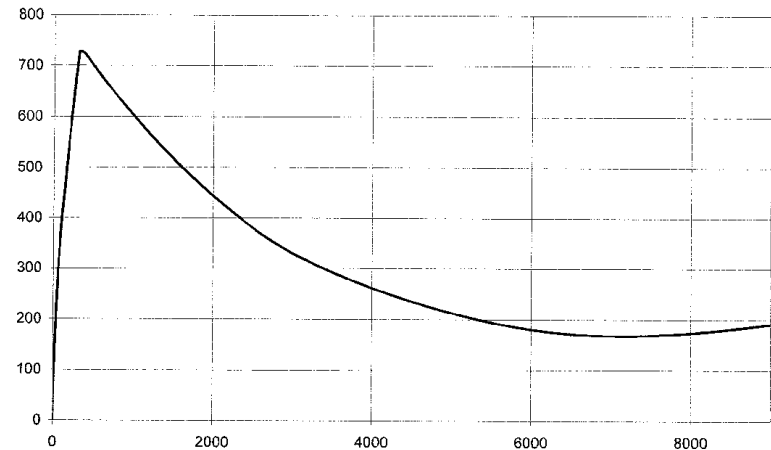
FZ90 motor is EMI/EMC resistant and they benefits from an extendable shelf life (10 years) thanks to their design

FZ90 specificities

- Compatibility: all the 2.75'' warheads and dual purpose (FFAR and WA) rocket launchers
- Propellant grain: extruded double base with star-shaped center hole
- Length: 1,060 mm
- Smokeless, non-corrosive, igniter with HERO filter



Velocity (m/s) with FZ71-FZ319-FZ181-FZ120 warhead
(H/C speed: 0 Kts)



Conventional warheads

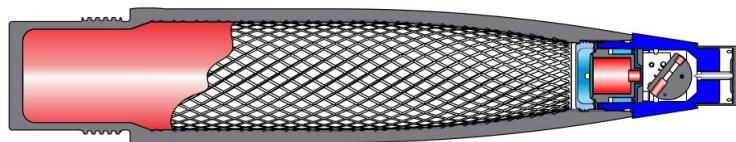


High Explosive General Purpose (HEGP) FZ71



Total mass 4.3 kg

Explosive mass 1 kg

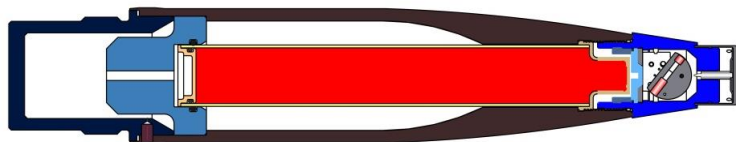


High Explosive Armor Piercing (HEAP) FZ319



Total mass 4.3 kg

Explosive mass 1 kg

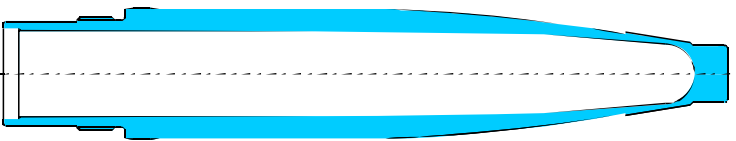


Flash Signature FZ181



Total mass 4.3 kg

Flash powder mass 0.2 kg



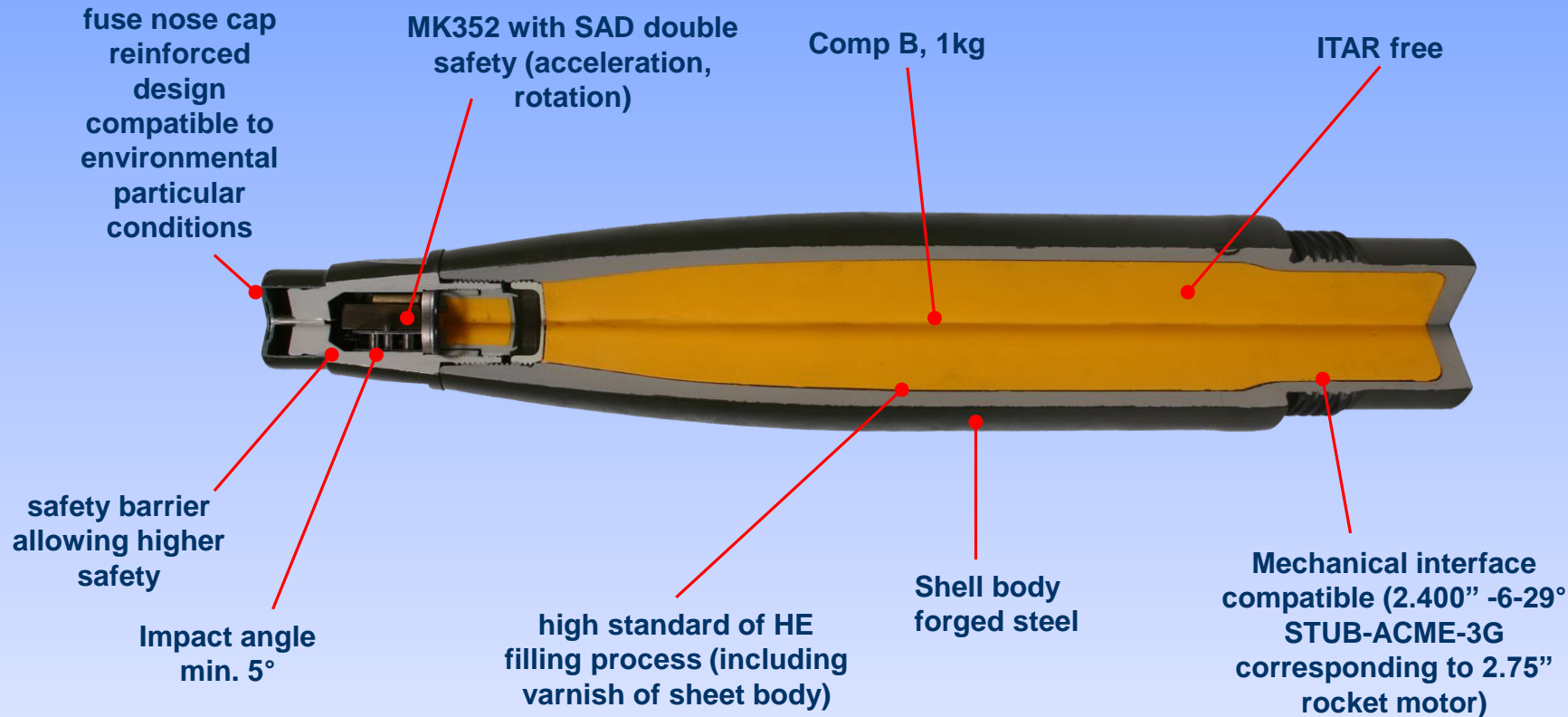
Practice FZ120



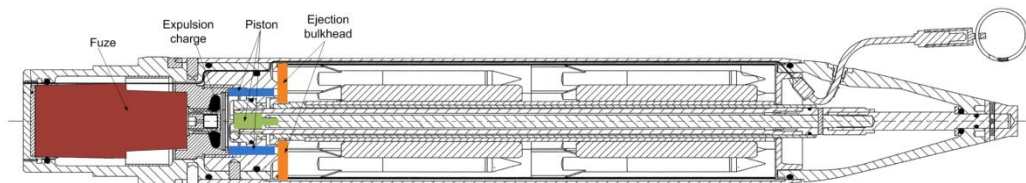
Total mass 4.3 kg

No pyrotechnic components

FZ71 - 2.75" rocket warhead - main differentiators

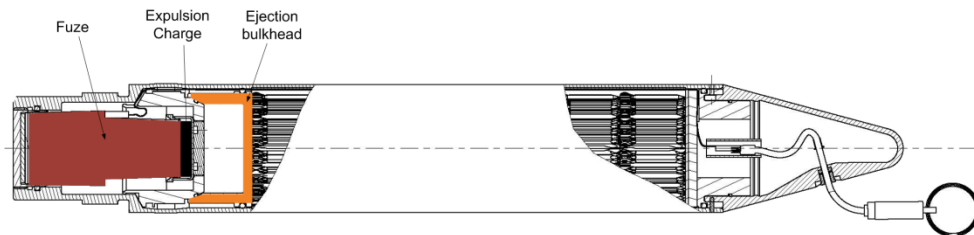


Sub-projectile warheads



Multidart FZ149 Cargo warhead

Total mass 3.4 kg
Subprojectile 36 darts of 35 g each



Flechette FZ122 Cargo warhead

Total mass 5.0 kg
Subprojectile 2,200 flechettes of 1.3 g (20 grains) each



Connection of the programmable fuze to the launcher

Rotary Wing aircraft launcher systems

Launchers for rotary wing A/C, fitted with:

- ◆ C/W 14" suspension lugs
- ◆ Safety flag



Launchers with LIU

- > Empty mass:
- > Loaded mass:
- > Length:
- > Detent:

FZ233

26 kg
From 84 to 104 kg
1,653 mm
FZ125

FZ231

31 kg
From 131 to 165 kg
1,658 mm
FZ125

FZ225

46 kg
From 204 to 259 kg
1,668 mm
FZ125

Launchers without LIU

- > Empty mass:
- > Loaded mass:
- > Length:
- > Detent:

FZ220

20 kg
From 79 to 99 kg
1,653 mm
FZ125

FZ219

29 kg
From 126 to 160 kg
1,658 mm
FZ125

FZ207

41 kg
From 199 to 254 kg
1,668 mm
FZ125

M159

67 kg
From 245 to 282 kg
1,934 mm
FZ125

Fixed Wing aircraft rocket launchers

Aluminum launchers for fixed wing A/C, fitted with:

- ◆ front and rear fairing
- ◆ C/W 14'' suspension lugs
- ◆ Intervalometer
- ◆ Safety flag



7 tubes



19 tubes

LAU32 MOD.4

Single purpose for motors equipped with FFAR fins

- > Empty mass: 38 kg
- > Loaded mass: From 97 to 117 kg
- > Length: 1,839 mm
- > Outer Ø: 252 mm

LAU51 MOD.4

with FZ81 detent

Single purpose for motors equipped with FFAR fins

- 77 kg
- From 236 to 291 kg
- 1,893 mm
- 402 mm

LAU32 MOD.5

Dual purpose for motors equipped with FFAR or WA fins

- > Empty mass: 37 kg
- > Loaded mass: From 96 to 116 kg
- > Length: 2,003 mm
- > Outer Ø: 252 mm

LAU51 MOD.5

with FZ125 detent

Dual purpose for motors equipped with FFAR or WA fins

- 89 kg
- From 248 to 303 kg
- 2,307 mm
- 402 mm

Focus on ... Maintenance / Weight / Shelf Life

US - 70mm Rocket System (Hydra 70)



M261_19 : 40 kg (LAU-61 G/A digital launcher for use with APKWS : **93 kg**)
M261_19 : 239 kg with **19** M151
M261_19 : **315 kg** with **19** APKWS II

304 Rkts

- Full mechanical launcher, disposable after
 - Ratio of 30% unavailability
 - 16 Rockets per Tube are guaranteed
 - 304 Rockets per M261 (19)

FZ 2,75''-70mm Rocket System



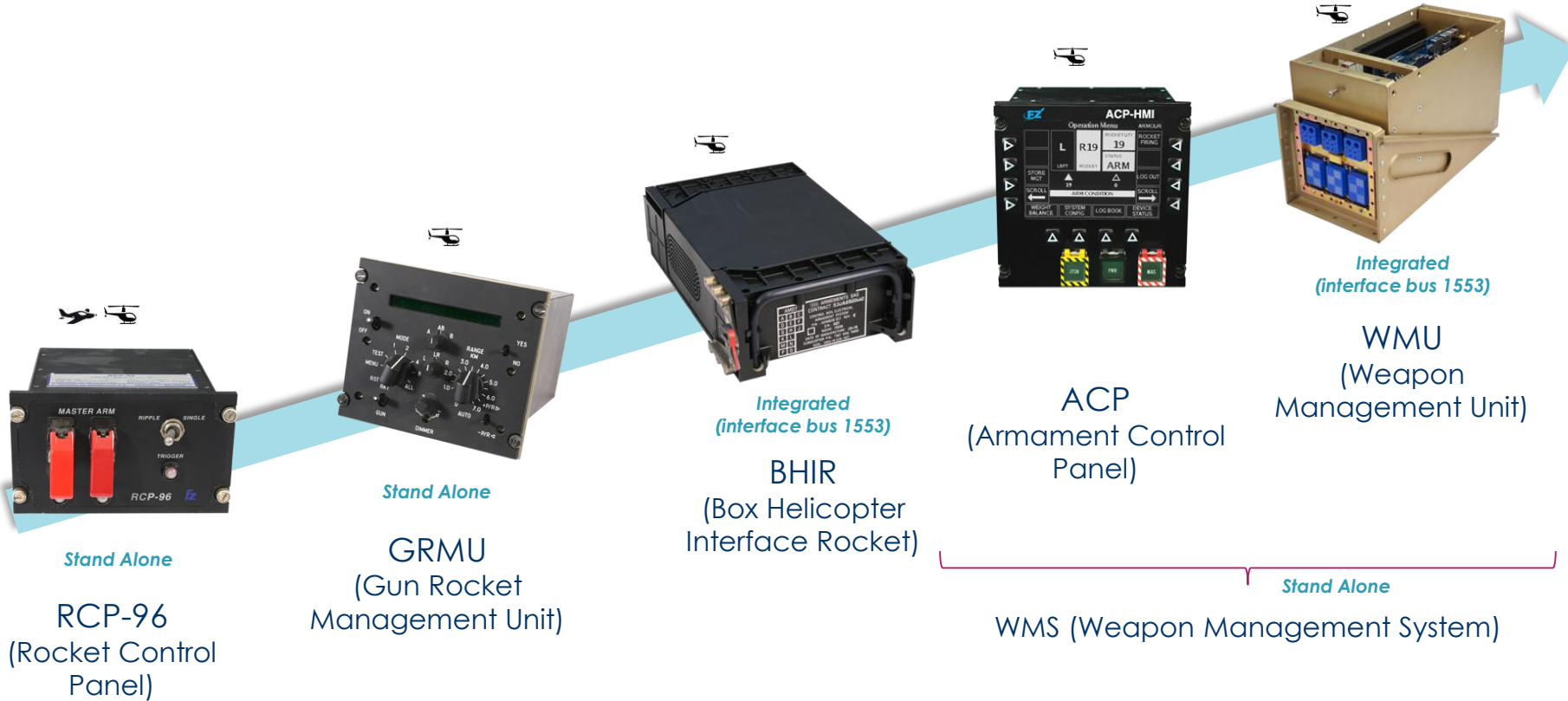
Maintainable

FZ225_19 : 46 kg (FZ207_19 : 41 kg)
FZ225_19 : 245 kg with **19** FZ209
FZ225_19 : **284 kg** with **19** FZ275 LGR

>1900 Rkts

- Smart Launcher with electronic interface
- Guaranteed >100 firings per tube
- Maintainable :
 - clean "detent mechanisms" every 10 firings,
 - replace it every 30 firings.
- Repairable (tube replacement)

Firing control systems



2.75" (70 mm) ROCKET SYSTEM WORLD SPECIALIST



- > International calibre
- > Providing a complete rocket system
- > Over 50 years experience
- > Production of more than 8 million rockets
- > Over more than 500 rocket systems adopted on various platforms in the last 10 years
- > Historically integrated worldwide
- > System integration on different carriers: rotary wing, fixed wing aircraft, vehicles
- > Mastered technologies: propulsion, pyrotechnics, mechanics, electronics, composite material, ballistics, guidance and simulation

ROCKET MOTORS

Folding-Fins Aerial Rocket motor (FFAR)



FZ67 (fixed wing A/C) / FZ68 (fixed wing A/C+ rotary wing A/C)

- Total impulse: 157 kN.s
- Range (ground to ground): ~ 720m
- Propellant grain: star shaped center hole walled double base
- Length: 1600 mm
- Mass: 5 kg
- Warhead interface: 3.438" (8.75") DIA A/CW 30, fully compatible with all the 3.25" rocket warheads
- Smokeless, non-corrosive
- Ready for assembly: < 4 hrs



Wrap Around rocket motor (WA)



FZ96 (fixed wing A/C+ rotary wing A/C)

- Total impulse: 160 kN.s
- Range (ground to ground): ~ 820m
- Propellant grain: star shaped center hole walled double base
- Length: 1740 mm
- Mass: 5.5 kg
- Warhead interface: 3.438" (8.75") DIA A/CW 30, fully compatible with all the 3.25" rocket warheads
- Smokeless, non-corrosive
- Ready for assembly: < 3 hrs



ROCKET WARHEADS

High Explosive warheads (HE)

FZ71

- General Purpose
- Total mass: 4.3 kg
- Length: 1000 mm
- Diameter: 70 mm
- Specifically designed for sub-aerial targets with a protection thickness < 7 mm



FZ319

- Light Armor Penetration
- Total mass: 4.3 kg
- Length: 1000 mm
- Diameter: 70 mm
- Specifically designed for light armored targets with an armor thickness > 7 mm



Flash Signature warhead

FZ181

- Tracing / target marking
- Total mass: 4.3 kg
- Length: 1000 mm
- Diameter: 70 mm
- 11 color pyrotechnic flash
- Illumination power: 1,500,000 candle for at least 10 ms
- 10 signature duration > 2s
- Smoke cloud of impact



Practice warhead

FZ128

- Tracing / practice
- Total mass: 4.3 kg
- No pyrotechnic components
- Same mass and ballistic as FZ123D-FZ128T



FZ336 (under qualification)

- Smoke for translocation
- Total mass: 4.3 kg
- No pyrotechnic components
- Smoke cloud at impact (30s)
- Same mass and ballistic as FZ123D-FZ128T



Sub-projectile rocket warheads

FZ149

- Multi-target
- Total mass: 3.3 kg
- Sub-projectile: 30 shots of 20 g each
- Impact: sub-aerial target, light armored vehicles, light boats and attack on the ground
- Multiple firing suitable to attack columns of vehicles, convoys, other sites, air defense facilities



FZ122

- Flare/tear
- Total mass: 1.1 kg
- Sub-projectile: 3,000 flares/tear at 1.1 A each
- Targets: light vehicles, boats, aircrafts on ground
- Multiple firing against sea targets



ROCKET LAUNCHERS

Launchers for rotary wing A/C

7 TUBES - COMPOSITE LIGHTWEIGHT LAUNCHERS

FZ231 provided with Launcher Interface Unit (LIU)

- Mass (empty) : ~19kg
- Length (internal) : 1600mm

FZ220 provided without Launcher Interface Unit (LIU)

- provided without Launcher Interface Unit (LIU)
- Mass (empty) : ~15kg
- Length (internal) : 1600mm



10 TUBES - COMPOSITE LIGHTWEIGHT LAUNCHERS

FZ231 provided with Launcher Interface Unit (LIU)

- Mass (empty) : ~23kg
- Length (internal) : 1600mm

FZ219 provided without Launcher Interface Unit (LIU)

- Mass (empty) : ~19kg
- Length (internal) : 1600mm



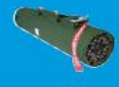
10 TUBES - COMPOSITE LIGHTWEIGHT LAUNCHERS

FZ225 provided with Launcher Interface Unit (LIU)

- Mass (empty) : ~40kg
- Length (internal) : 1600mm

FZ207 provided without Launcher Interface Unit (LIU)

- Mass (empty) : ~36kg
- Length (internal) : 1600mm



10 TUBES - ALUMINUM LAUNCHER

M129

- Mass (empty) : ~60kg
- Length (internal) : 1600 mm



Launchers for fixed wing A/C

7 TUBES - ALUMINUM LAUNCHERS

LA132 MOD 4 MOD 5

- Single purpose
- Total mass: 100 kg
- Length (internal): 1600 mm
- Mass (empty): ~100 kg
- Length (internal): 1600 mm
- Mass (empty): ~100 kg
- Length (internal): 1600 mm



10 TUBES - ALUMINUM LAUNCHERS

LA151 MOD 4 MOD 5

- Single purpose
- Total mass: 100 kg
- Length (internal): 1600 mm
- Mass (empty): ~100 kg
- Length (internal): 1600 mm
- Mass (empty): ~100 kg
- Length (internal): 1600 mm



FIRING CONTROL SYSTEMS

RCP-96 (Rocket Control Panel)



- For conventional rockets
- Management up to 3 rocket launchers
- For both VHS and AT integration
- Usually combined with AT electronic sub-calculator FZ79

GRMU* (Gun Rocket Management Unit)



- For conventional rocket warheads and rocket warheads with remote set fires
- Rocket launcher and gun pod management up to 4 tubes
- 1200 pins

BHIR* (Box Helicopter Interface Rocket)



- Firing control systems for FZ 70 even coded systems for:
- Management up to 4 rocket launchers (FZ 12-70 tubes)
- Compatible with conventional sub-calculator and rocket warheads with remote set fires
- interfacing with the Management System of the attacking aircraft, see M15 STD-160
- 1200 pins

ACP (Armament Control Panel)



- 2nd stage combined with WMU or BHR
- User friendly interface
- 7" APC screen
- 7" gun/rocket status keys
- 1200 programmable entries
- Integrated master air switch
- Selective attention
- Night vision compatible

WMU (Weapon Management Unit)



- For conventional rocket warheads, guided rockets and sub-rocket warheads with remote set fires
- Rocket launcher and gun pod management up to 4 tubes
- Interface with helicopter mission computer by:
 - Arma 420, M15 STD-160, BG-420
- Firing tables and ballistic calculation
- Management of other equipment such as sighting system, IR/UV, LIDAR
- Connected to RCP to form a complete Weapon Management System (WMS)
- Latest technology and development with low risk of obsolescence
- Type of connector: MIL E 15507

FORGES DE ZEEBRUGGE

THALES

FZ275 LGR - Description

Main Modules

SEEKER

- SAL (Semi Active Laser)
- NATO compatible
- Wave length: 1064nm (STANAG-3733)

CAS (Control Actuator System)

- 4 canards
- Steering angle restriction possibility (for training)
- Water tightness

ECU (Electronic Controller Unit)

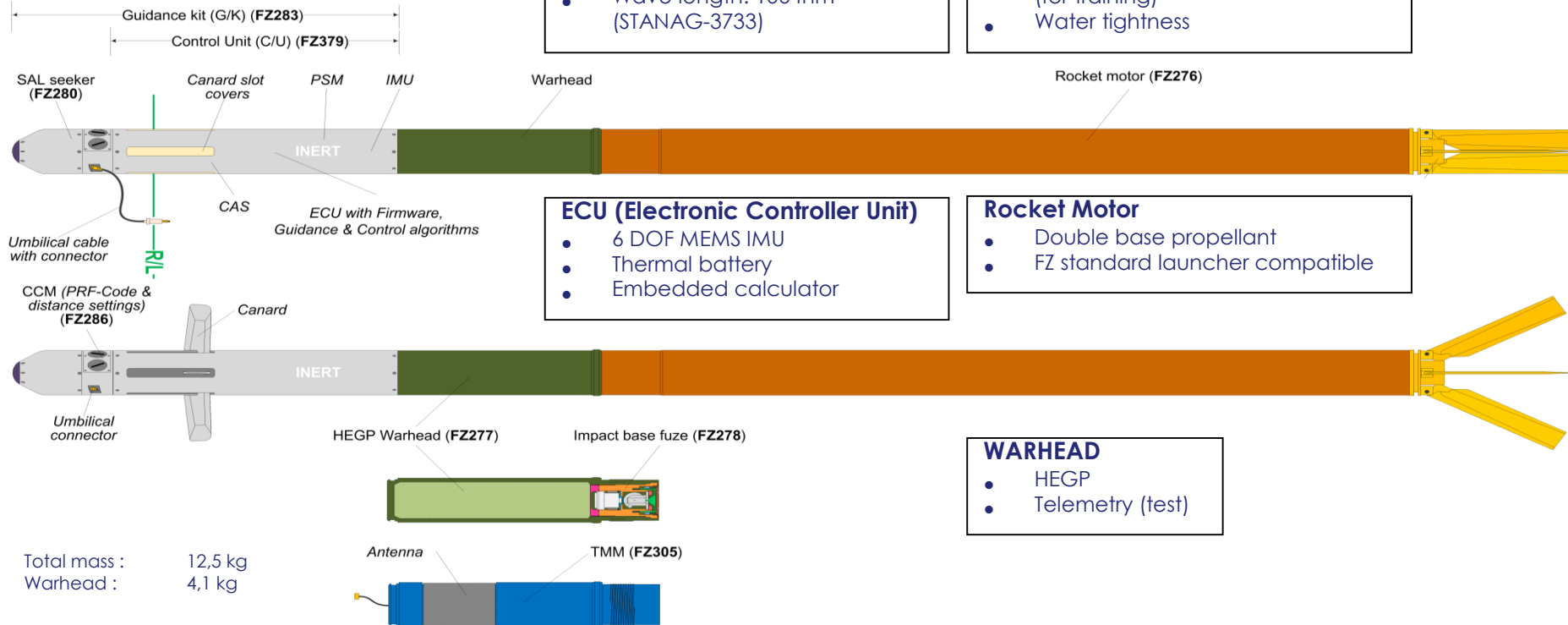
- 6 DOF MEMS IMU
- Thermal battery
- Embedded calculator

Rocket Motor

- Double base propellant
- FZ standard launcher compatible

WARHEAD

- HEGP
- Telemetry (test)



FZ275 LGR – Main Features

PERFORMANCES

- > Range : 1.5 km to 6 km
- > CEP: 1 m @ range of 6 km

FZ275 LGR MEETS OPERATIONAL NEEDS

- > Compatible with 2.75" rocket system
- > Low cost guided ammunition
- > Flexibility
- > Lower platform vulnerability
- > High first hit probability
- > Improved stand-off range
- > Pinpoint accuracy
- > Air-to-ground firing
- > Fixed wing and rotary wing compatible
- > Day and night operation
- > No maintenance required
- > Reduced pilot training

CHARACTERISTICS

- > Calibre : 2.75" (70 mm)
- > Length : ~1800 mm
- > Weight : 12.5 kg (before burn)
- > Guidance : SAL (Semi-Active Laser)
- > Steering type : 4 canards
- > Limited integration work

TARGETS (stationary & mobile)

- > Soft and light armoured vehicles
- > Air defence facilities
- > Radar & Communication post
- > Aircraft on ground
- > Small ships and patrol boats
- > Soft bunkers
- > Snipers, ...

Tiger HAD Spain : 2 x FZ233 (7-T), 2 x FZ225 (19-T)



Tiger ARH (Australia) : 2 x FZ233 (7-T), 2 x FZ225 (19-T)



Tiger UHT (Germany) : 2 x FZ225 (19-T)

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2015 All rights reserved.

