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# Typhoon FGR Mk 4 and T Mk 3

**References:**
DAP 101B-5400-1A
Royal Air Force web site (photo source)

**Typhoon FGR Mk4**
**(Royal Air Force)**

## Contents

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# General Overview

| | |
|---|---|
| Crew | 1, 2 in training aircraft variant |
| Passengers places | None |
| A/C Type | Twin Engine, single seat fighter |
| Main Dimensions | Wingspan 10.95 M, Length 15.96 M Height 5.23 M |
| Mass | 21,000Kg (max take-off weight) |
| Fuel capacity | 5060 Kg (6326 Litres) (internal only))<br>7355 Kg (9193 Litres) (max capacity with all external tanks full)<br>**NOTE**! Twin seat training aircraft has 768 Kg less fuel |
| Fuel Type<br>(kerosene based) | F-34 Avtur with FSII (JP8)<br><br>Alternative approved fuels with similar properties<br>F35 Avtur (Jet A-1)<br>F40 Avtag FSII (JP4)<br>F44 Avcat FSII (JP5) |
| De-icing / screen-wash fluids | No |
| Liquid oxygen | No |
| Oils (quantities in excess of 1 litre) | OM-15 (mineral hydraulic fluid)<br>OX-27 – (synthetic oil) |
| MMMF | Carbon and Glass reinforced plastics |
| Compressed oxygen | Yes |
| Compressed nitrogen | Yes |
| Compressed air | No |
| Pyrotechnic synopsis | Canopy ejection rockets<br>Ejector seat cartridges, Ejector seat rockets<br>Pyrotechnic signal kit |
| Assisted Escape System | Martin-Baker Mk 16-A (Qty 1) 2 in training aircraft |
| Weapons | Permanently installed 27 mm cannon<br>Pylon mounted role equipment – see explosive materiel |
| Pyrotechnic countermeasures | Pylon mounted role equipment – see explosive materiel |
| Radioactive Materials | Thorium Fluoride |

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| **Liquids** | | | Back to Typhoon contents |
| **Fuel** | | | **F-34 Avtur FSII MSDS** |
| Internal fuel system | Wings and fuselage | 6325 litres | Other similar fuels authorised – general overview<br>Internal tank location |
| External fuel tanks | 3 tanks – 2 inboard wing pylons (left & right), 1 under fuselage tank | 3000 litres<br>(tanks x 3 total) | External tank location |
| | | | |
| **Hydraulic fluid (mineral oil)** | | | **OM-15 MSDS**<br>**(NATO H-515) Also cleared for OX538 although currently not used in service.** |
| Left system reservoir Number 1 | Left fuselage forward of fin | 14 litres<br>(plus system capacity) | Reservoir location picture<br>Item number 28 |
| Right system reservoir Number 2 | Right fuselage forward of fin | 14 litres<br>(plus system capacity) | Reservoir location picture<br>Item number 22 |
| Parking-brake accumulator | Inside parking brake module | Qty 1<br>280 bar | **CAUTION Retains stored fluid under accumulator pressure**<br>Parking brake module location picture<br>Item number 8 |
| Canopy accumulator | Right fuselage below cockpit | Qty 1<br>280 bar | **CAUTION Retains stored fluid under accumulator pressure**<br>Canopy accumulator location picture<br>Item number 6 |
| Cockpit ladder accumulator | Left fuselage inboard of left wing root | Qty 1<br>280 bar | **CAUTION Retains stored fluid under accumulator pressure**<br>Cockpit ladder location |
| Main landing gear shock absorber | Left and right landing gear bay | Qty 2 (1 / side)<br>Approx 9.7 litres | MLG Picture |

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| Nose landing gear shock absorber | Below cockpit | Qty 1<br>Qty not known | NLG Picture |
| Arrestor hook shock absorber | Arrestor hook | Qty not known<br>Max operating pressure 205 bar | Arrestor hook shock absorber location |
| | | | |
| **Engine lubricant (synthetic oil)** | | | **OX-27 MSDS** |
| Engine oil | Left engine | 10 litres approx<br>2.2 Imp galls approx | Engine oil tank location picture Item 1 |
| Engine oil | Right engine | 10 litres approx<br>2.2 Imp galls approx | Engine oil tank location picture Item 1 |
| Accessories gearbox oil (left) | Centre mid fuselage | 2.4 litres<br>0.5 Imp galls | Accessory gearbox location |
| Accessories gearbox oil (right) | Centre mid fuselage | 2.4 litres<br>0.5 Imp galls | Accessory gearbox location |
| APU oil tank | Lower centre fuselage | Capacity not known | APU liquid sight indicator picture |
| | | | |
| **Coolant** | | | **Aeroshell Fluid 602 MSDS Alternative of Pentosin 602** |
| RADAR/FLIR liquid cooling system | Nose RADAR pack | Capacity not known | Radar cooling system location picture |
| | | | |
| **Electrolyte** | | | **Potassium Hydroxide** |
| Main battery electrolyte (Potassium Hydroxide) | Main battery – centre left lower fuselage | Qty 1<br>22.8V 25 Ah | **Battery MSDS**<br>Battery location |

**Pressurised Gases continues on the next page**

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| **Pressurised Gases** | | | Back to Typhoon contents |
| **Nitrogen** | | | **Nitrogen MSDS** |
| Main accumulators | Main fuselage below tailfin, left and right | Qty 2<br>5.49 litres capacity<br>144 bar | Accumulators location picture<br>Items 24 & 26 |
| Main landing gear shock absorber | Below left and right wings | Qty 2 (1 / side)<br>1st stage 9.5 bar<br>2nd stage 113 bar | MLG Picture |
| Nose landing gear shock absorber | Below cockpit | Qty 1<br>1st stage 9.7 bar<br>2nd stage 128 bar | NLG Picture |
| Main landing gear wheels | Main landing gear | Qty 2 (1 / side)<br>20.1 – 23.5 bar | MLG Picture |
| Nose landing gear wheels | Nose landing gear | Qty 1<br>15 – 22 bar | NLG Picture |
| Arrestor hook shock absorber | Arrestor hook | Absorber maximum geometric gas volume<br>150 litres | Arrestor hook shock absorber location |
| **Oxygen** | | | **Oxygen MSDS** |
| Auxiliary oxygen supply | Seat-mounted cylinder | Qty 1,per seat<br>220 litres<br>190 bar approx at 20°c | Oxygen bottle location |
| **Carbon dioxide** | | | **Carbon dioxide MSDS** |
| Disposable gas cylinder (1 per life preserver) | Flight jacket (type A) | 40g (charged) | Cylinder location picture |

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| Disposable gas cylinder | Liferaft inflation cylinder located in ejection seat PSP (personal Survival Pack) | 911g min (charged) | PSP location picture<br><br>PSP single seat lifereaft |
| | | | |
| **Helium** | | | **Helium MSDS** |
| Canopy accumulator | Right fuselage below cockpit | Pre charged 140 bar | Canopy accumulator location picture item 6 |
| Cockpit ladder door accumulator | Left fuselage below cockpit | Pre charged 124.1 bar | Ladder door accumulator location picture |
| Parking brake accumulator | Located inside parking brake module | 62.5 – 77.5 bar | Parking brake module location picture item 8 |

**Solids continues on the next page**

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| **Solids** | | | Back to Typhoon contents |
| Cadmium | Main battery – Centre left lower fuselage | Qty 1<br>22.8V 25 Ah | **Battery MSDS**<br>Cadmium info<br>Battery location |
| Lithium / Manganese Dioxide | Sarbe 7 Personal locator Beacon battery pack, located in flight jacket (type A) | 1 battery pack per jacket | **Battery MSDS**<br>Lithium battery information<br>Sarbe 7 picture and information |
| Chromium Trioxide | Used in aircraft engines / Airframe (paints, primers and special coatings) | Quantity not known | **Chromium Trioxide MSDS** |
| Composite materials | Aircraft structure and equipment access panels - various | Quantity not known | Man Made Mineral Fibres (MMMF) info |
| Plastics / PTFE Glazing, wiring, small bearings etc | Throughout airframe | Quantity not known | Plastics and polytetrafluoroethylene |
| Titanium | Certain aircraft structures and engine components | Quantity not known | **Powdered Ti MSDS**<br><br>Titanium info |
| Strontium Chromate | Airframe (paints, primers and special coatings) | Quantity not known | Chromate Primer Paints |
| Potassium Hydroxyoctaoxodizincatedichromate (Zinc Potassium Chromate) | Airframe (paints, primers and special coatings) | Quantity not known | Chromate Primer Paints |
| Potassium Dichromate | Airframe (paints, primers and special coatings) | Quantity not known | Chromate Primer Paints |
| Dichromium Tris(chromate) | Airframe (paints, primers and special coatings) | Quantity not known | Chromate Primer Paints |

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| Sodium Dichromate | Airframe (paints, primers and special coatings) | Quantity not known | Chromate Primer Paints |

**Explosive Materiel continues on the next page**

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| **Explosive Materiel** | | | Back to Typhoon contents |
| **Countermeasures** | | | |
| Flare dispensers | Wing-mounted pods | 2 dispensers, 16 flares per dispenser | Dispenser locations |
| Chaff dispenser | Wing-mounted pods | 2 dispensers, 160 ± 3 in each dispenser | Dispenser locations |
| **Pyrotechnics** | | | |
| Personal signalling kit | Crew equipment – pocket of flight jacket (type A) | 1 kit per jacket | **Signal kit MSDS**<br><br>Pyrotechnic Signal Kit info and picture |
| Signal Flare Day and Night No 1 Mk 4 | Crew equipment – pocket of flight jacket (type A) | 1 per jacket | **Signal Flare Day and Night No1 Mk4 MSDS** |
| Advanced Light/Heavy Duty Ejector Release Unit cartridges | External pylons | Qty 2 cartridges per pylon Max 7 pylons | Pylon locations |
| **Weapons** | | | |
| Mauser 27 mm cannon | Internal weapon - right hand forward fuselage | 150 rounds | Location Picture |
| AMRAAM | External pylon mounted store | | Additional info |
| ASRAAM | External pylon mounted store | | Additional info |
| Brimstone | External pylon mounted store | | Additional info |
| Storm Shadow | External pylon mounted store | | Additional info |
| ALARM | External pylon mounted store | | Additional info |
| AIM-9 Sidewinder | External pylon mounted store | | Additional info |
| Paveway II & III | External pylon mounted store | | Additional Info |

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|
| Paveway IV | External pylon mounted store | | Additional Info |
| Enhanced Paveway | External pylon mounted store | | Additional Info |

**Radioactive Materiel continues on the next page**

# Main Hazards

| General Hazard | Location | Max Quantity Max Volume Max Pressure | MSDS / other useful info / picture links etc |
|---|---|---|---|

## Radioactive Materiel

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| Thorium Fluoride | | | Thorium Fluoride MSDS |
|---|---|---|---|
| Sensor lenses coated with Thorium Fluoride | Laser warner system, sensor head domes | Quantity not known. | Sensor head domes location picture<br>No hazard if the dome remains undamaged |

**End of main hazards**

## Typhoon Operators

| RAF Coningsby | RAF Lossiemouth | Falkland Islands |
|---|---|---|
| 3(F) Squadron | 1(F) Squadron | 1435 Squadron |
| XI(F) Squadron | II(AC) Squadron | |
| 12(B) Squadron | 6 Squadron | |
| 29 Squadron | IX(B) Squadron | |

**Additional Information continues on the next page**

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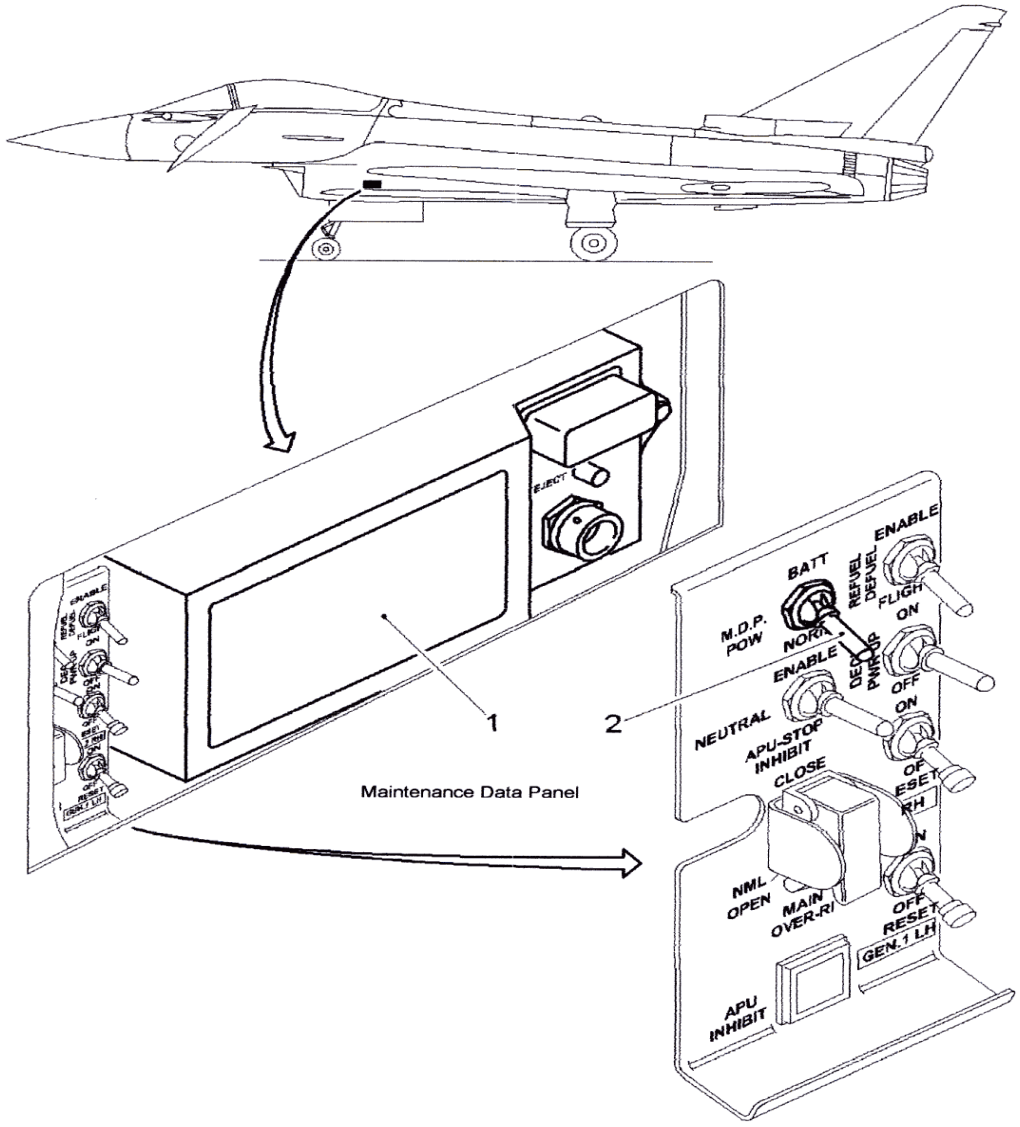
# Additional Information

**Normal Canopy Opening**
Set the MDP (Maintenance data panel), POW on the MDP to the BATT position. Make sure that the BATTERY MODE display is shown on the MDP. Set the CANOPY ACCU PRESSURE display on the MDP. **NOTE** if the ACTUAL contents valve on the MDP is the same as the MIN contents valve, the canopy hydraulic accumulator is not pressurized. Read the CANOPY ACCU PRESSURE display on the MDP and make sure that the canopy hydraulic accumulator is not pressurized.



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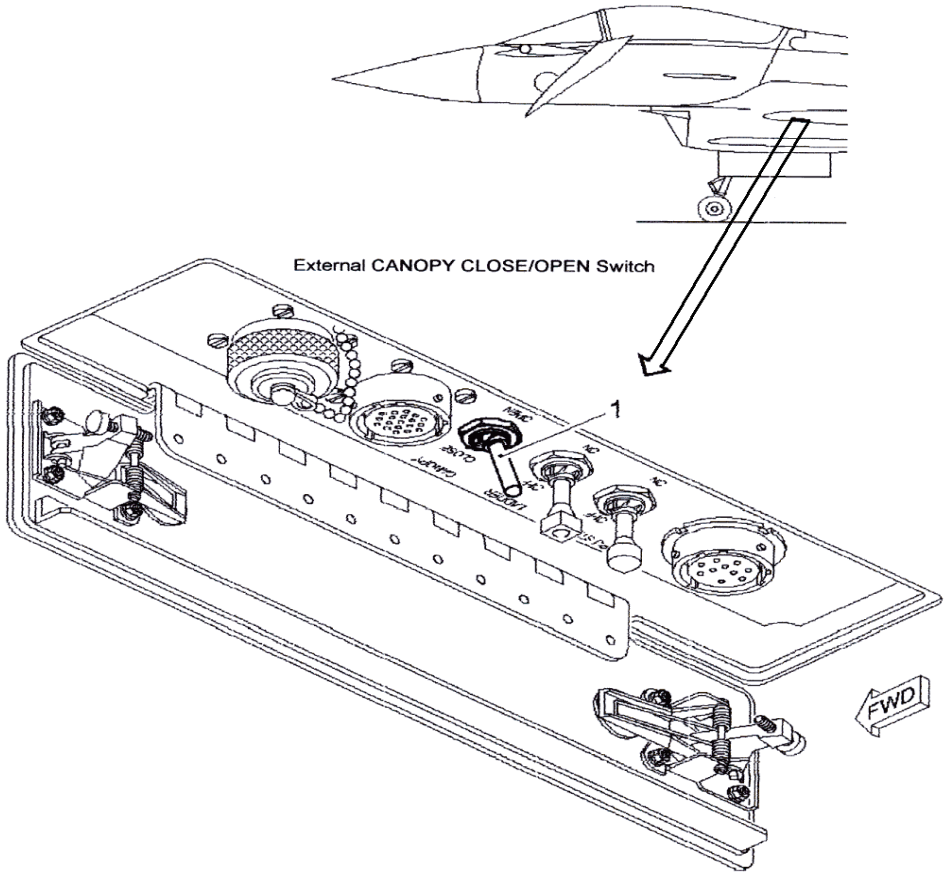
Open the access door 521FB and put the external CANOPY CLOSE/OPEN switch to the OPEN position and release it, the canopy assembly will then open. When the canopy is fully open, you must check that the canopy latch mechanism is engaged.



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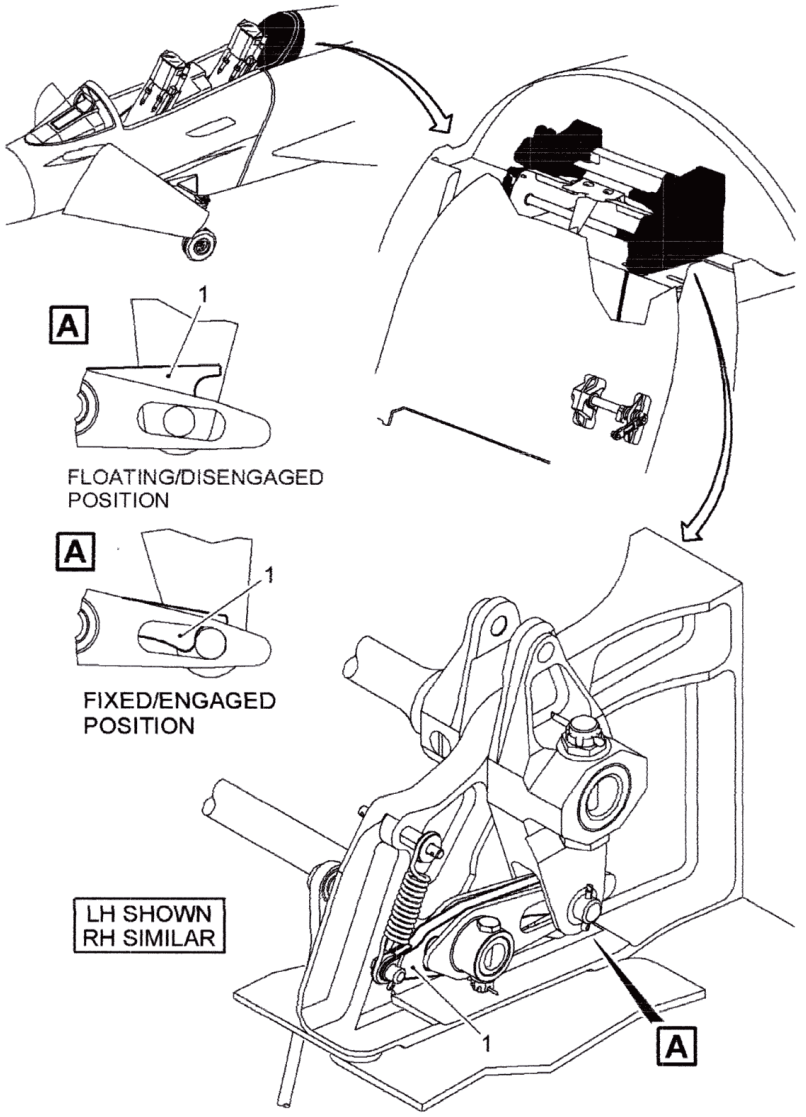
When the canopy is fully open, you must check that the canopy latch mechanism is engaged. If the latch is not engaged, you must apply a light pressure and push the canopy rearwards to engage the latch. Then set the MDP POW switch on the MDP to NORM.




Canopy Hinge Mechanism - Latch Positions.

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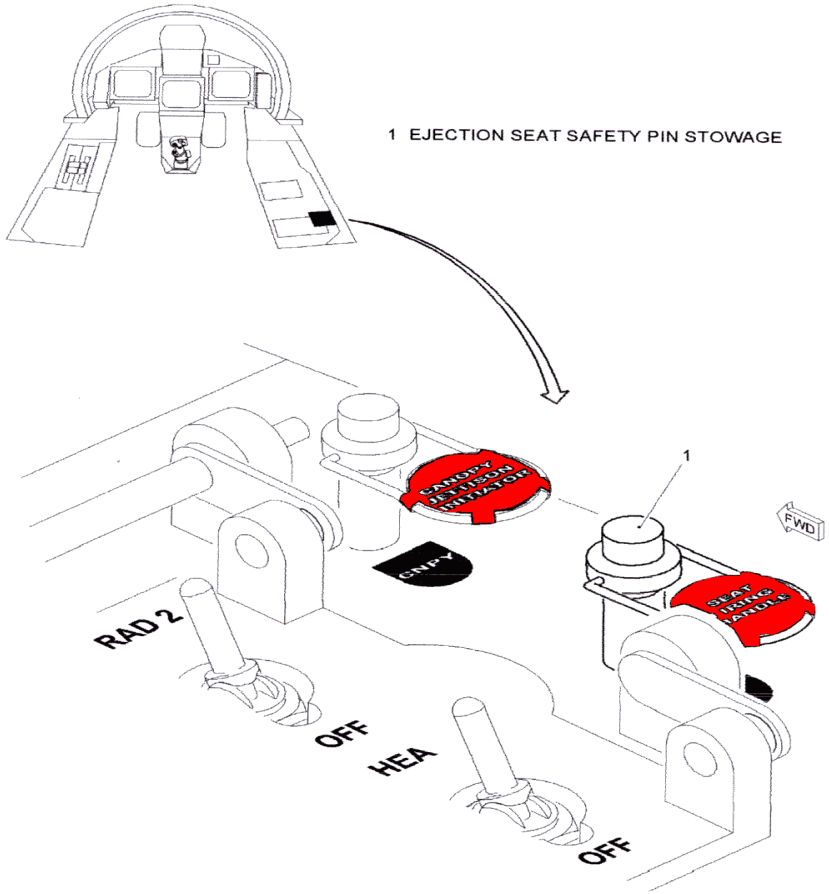
**Making the Cockpit Safe:**
**Aircraft Assisted Escape System (AAES) Safety Pins**

Typhoon is equipped with a Martin Baker fully automatic cartridge operated rocket assisted ejection seat. The canopy transparency can be rocket ejected or shattered by the seat itself. The seat and canopy may be “made safe” by fitting the correct safety pin in its respective location.

During flight, the pins are stowed in the right-hand console in the cockpit. The location of each pin is shown in the illustrations below.

WARNING – The Aircraft Assisted Escape System is a potential source of danger and inadvertent operation can cause fatal injury. To reduce the risk of inadvertent assisted escape system operation, the various safety pins must be moved from their stowed locations and fitted into the following:

Ejector seat firing handles (1 off)
Canopy jettison initiator unit sear (1 off)




Ejection Seat Safety Pin Stowage Location

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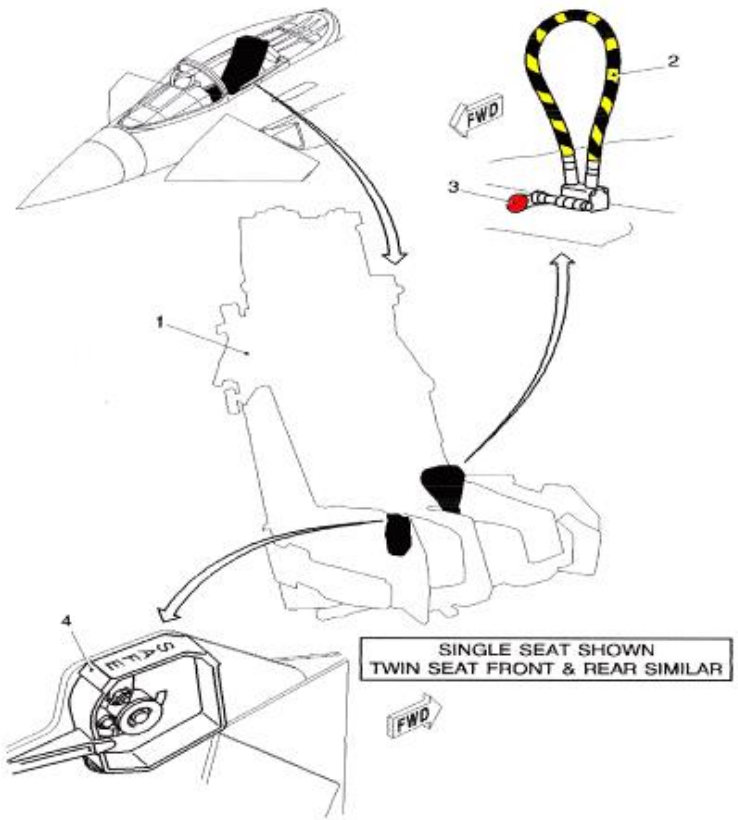
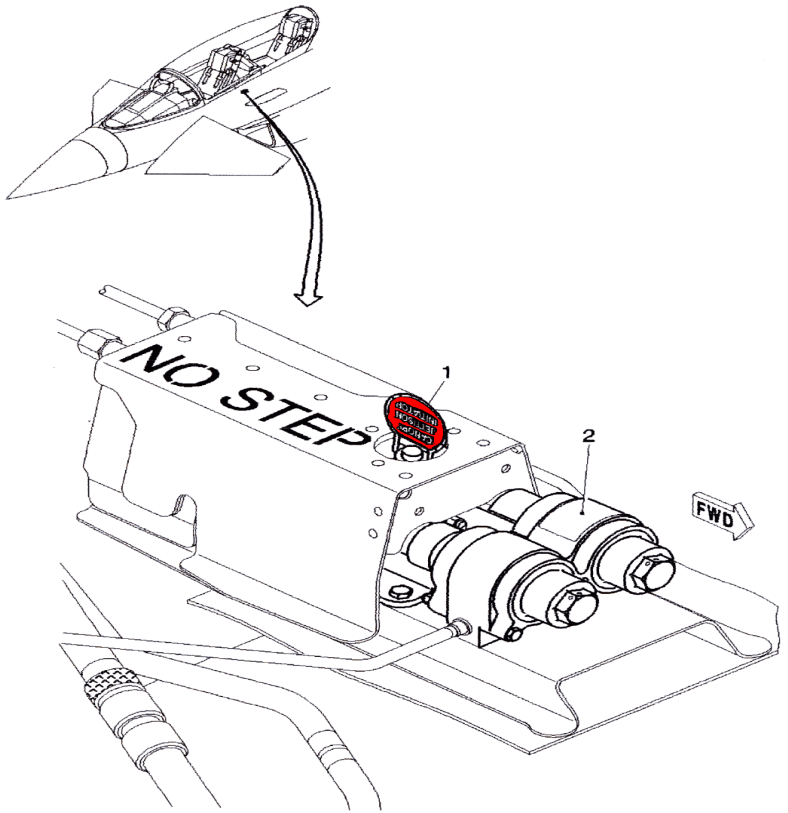
**Fitting AEES Safety Pins**

Fitting the **SEAT FIRING HANDLE** pin and the **CANOPY JETTISON INITIATOR** pin in the front cockpit will render the aircraft safe for parking only. These pins must be fitted prior to attempting crew extraction.

**CAUTION: It is entirely possible that some systems may have incurred post-incident damage; even with pins correctly fitted it is imperative that extreme care is taken when extracting casualties.**



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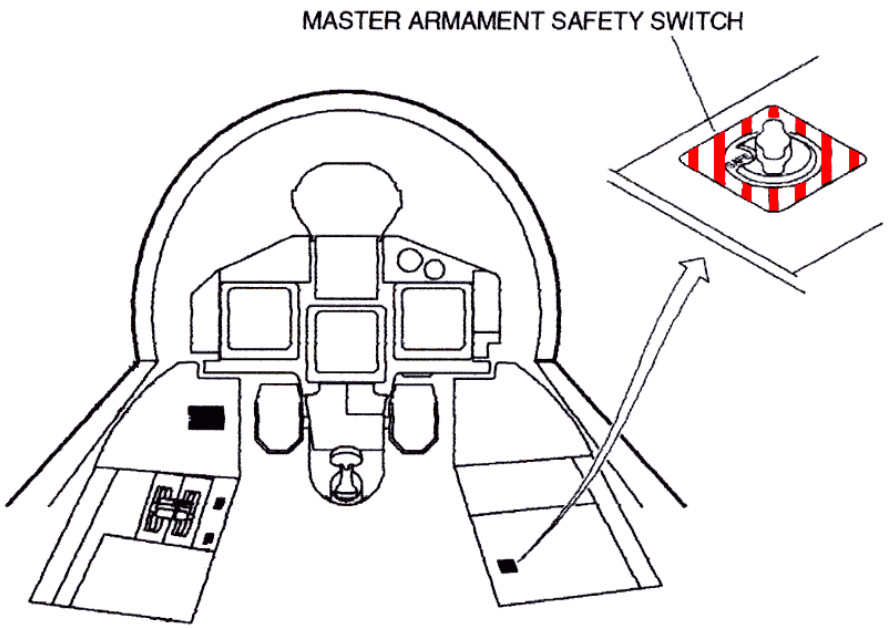
**Master Armament Safety Switch**




The MASS is a three-position rotary switch, selectable to
-SAFE: In this position, the ACS cannot perform ant functions.
-STBY: In this position, with the exception of arming, release, firing and jettison all functions of the ACS are enabled.
-LIVE: In this position all the ACS functions.

Selection of the MASS LIVE position is mechanically protected. The top of the control has to be raised (pulled) upward during the clockwise selection from STBY to LIVE. Only one of the legends will be visible.

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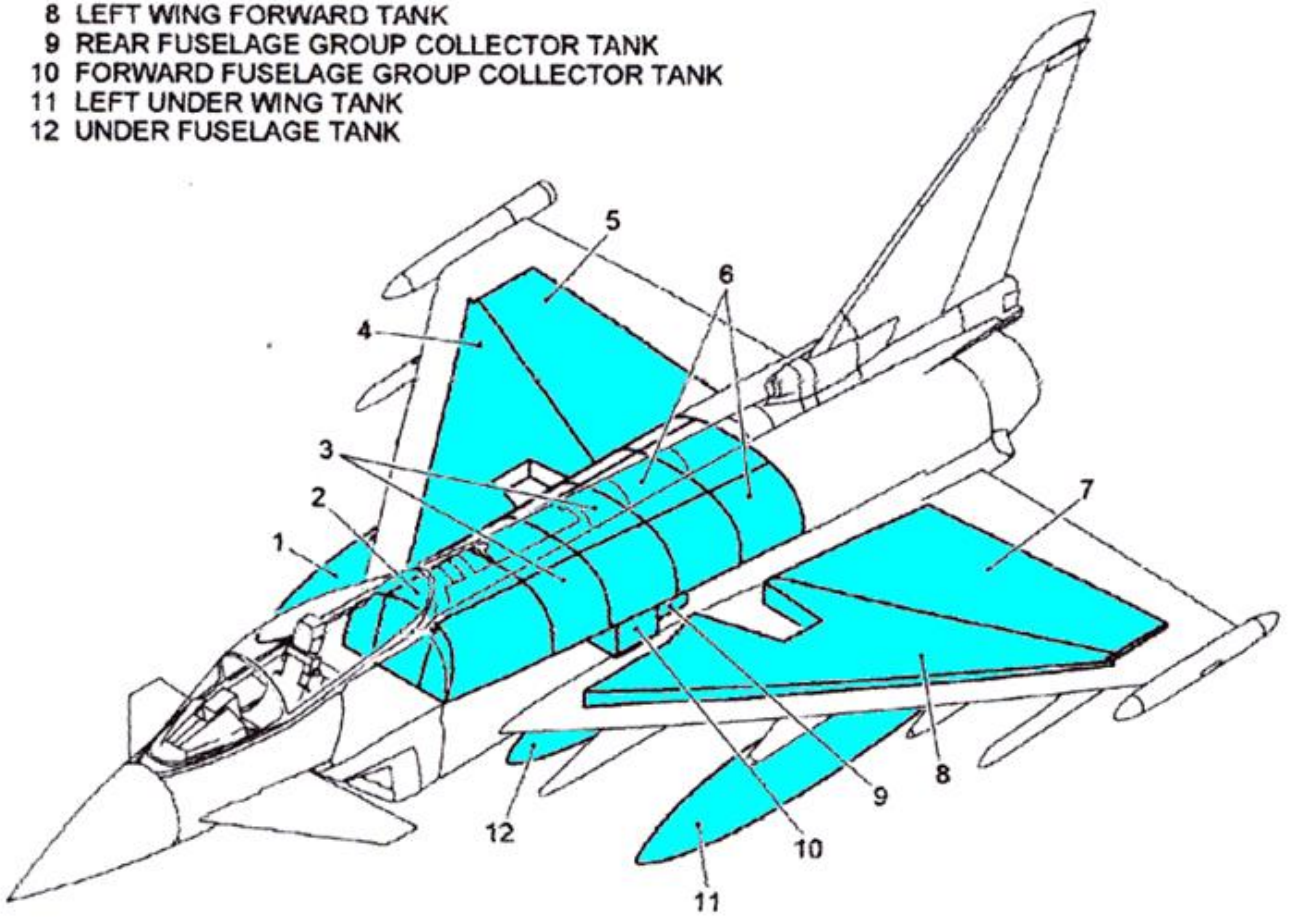
1 RIGHT UNDER WING TANK
2 FORWARD TRANSFER TANK
3 FORWARD FUSELAGE GROUP
4 RIGHT WING FORWARD TANK
5 RIGHT WING REAR TANK
6 REAR FUSELAGE GROUP
7 LEFT WING REAR TANK
8 LEFT WING FORWARD TANK
9 REAR FUSELAGE GROUP COLLECTOR TANK
10 FORWARD FUSELAGE GROUP COLLECTOR TANK
11 LEFT UNDER WING TANK
12 UNDER FUSELAGE TANK



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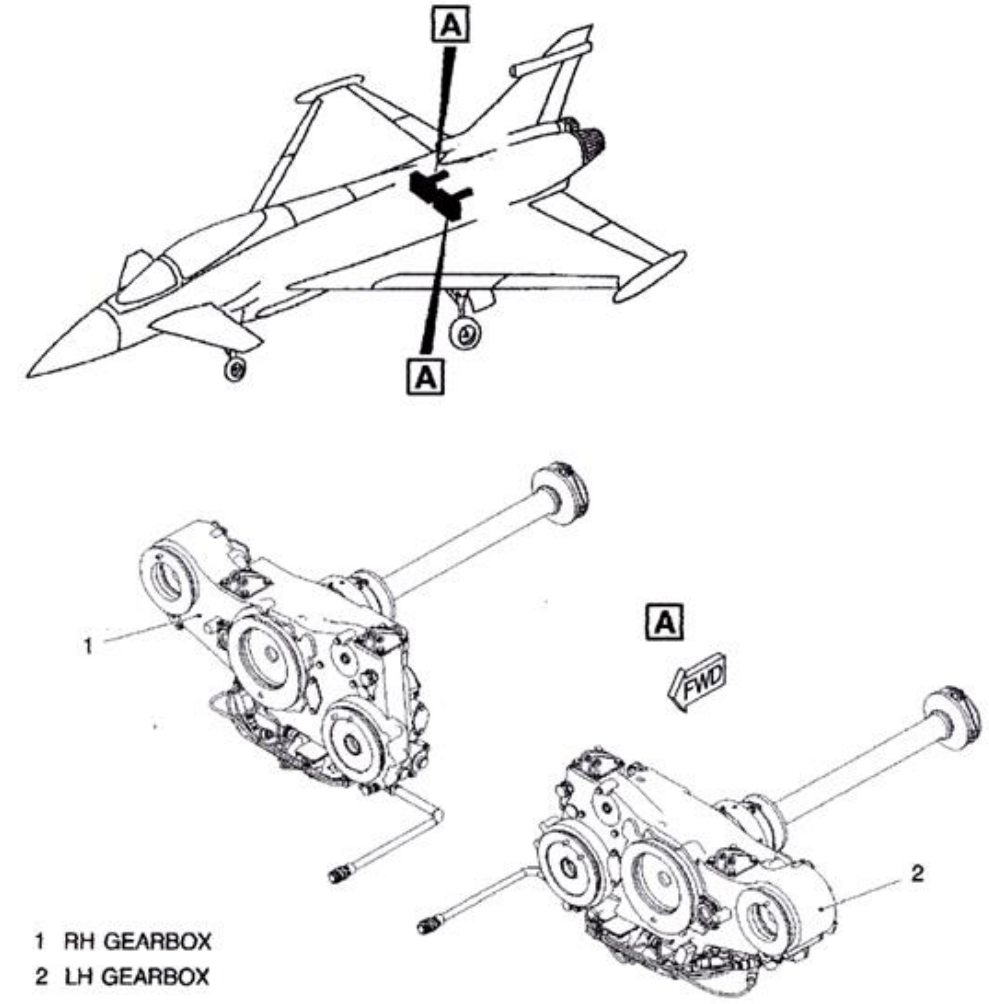


Accessory Gearboxes and Drive System - Location Diagram

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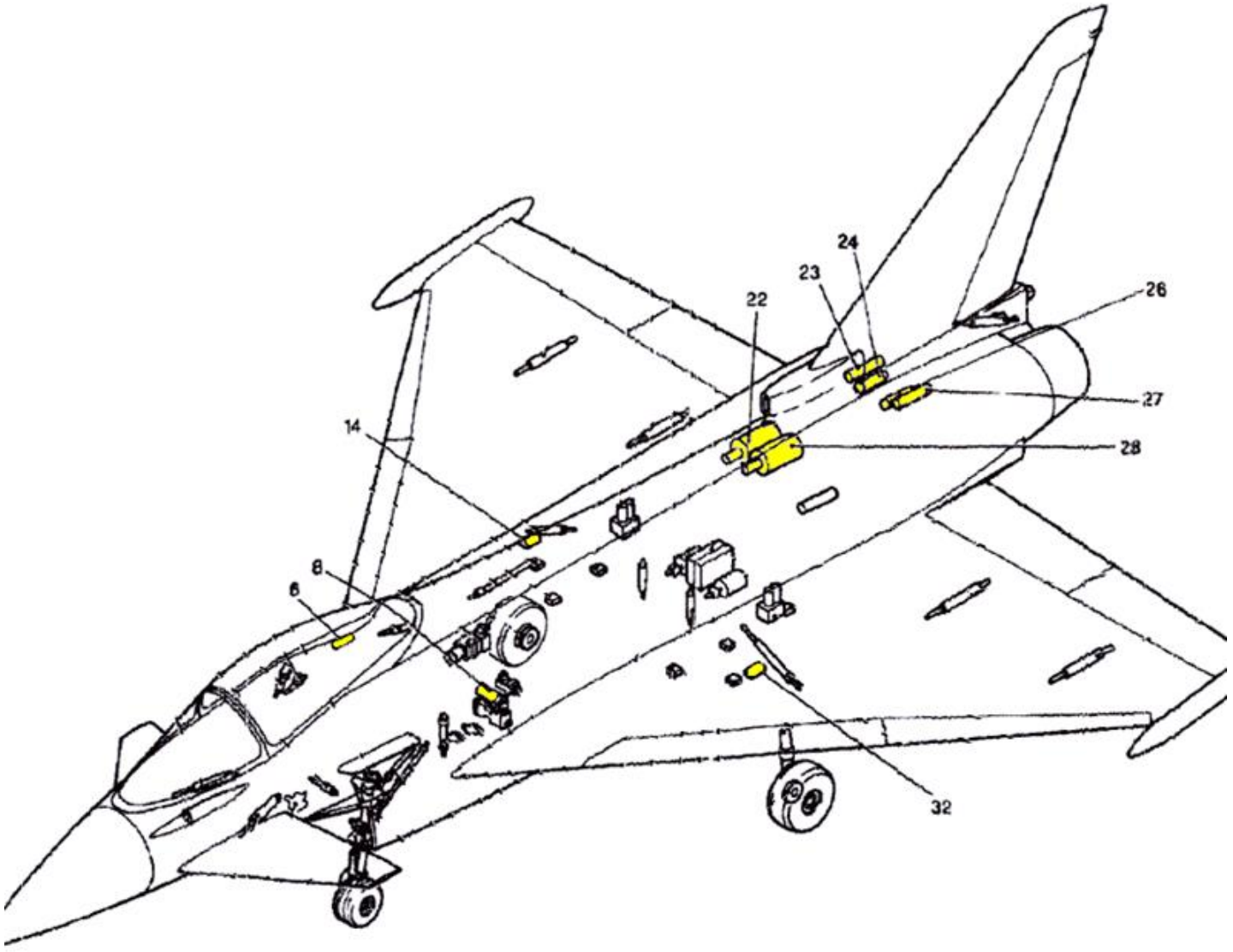

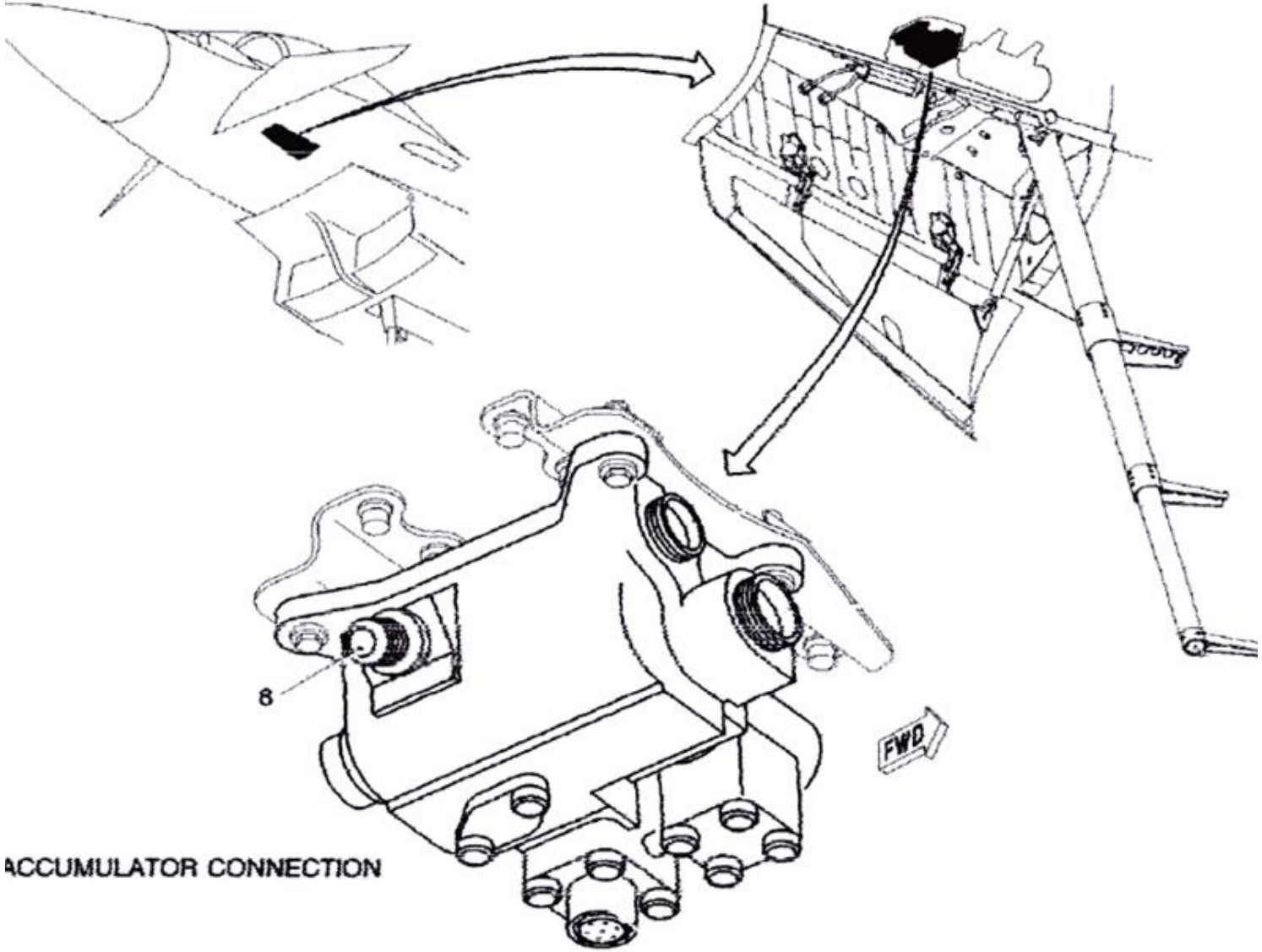
6
FWD
ACCUMULATOR CONNECTION

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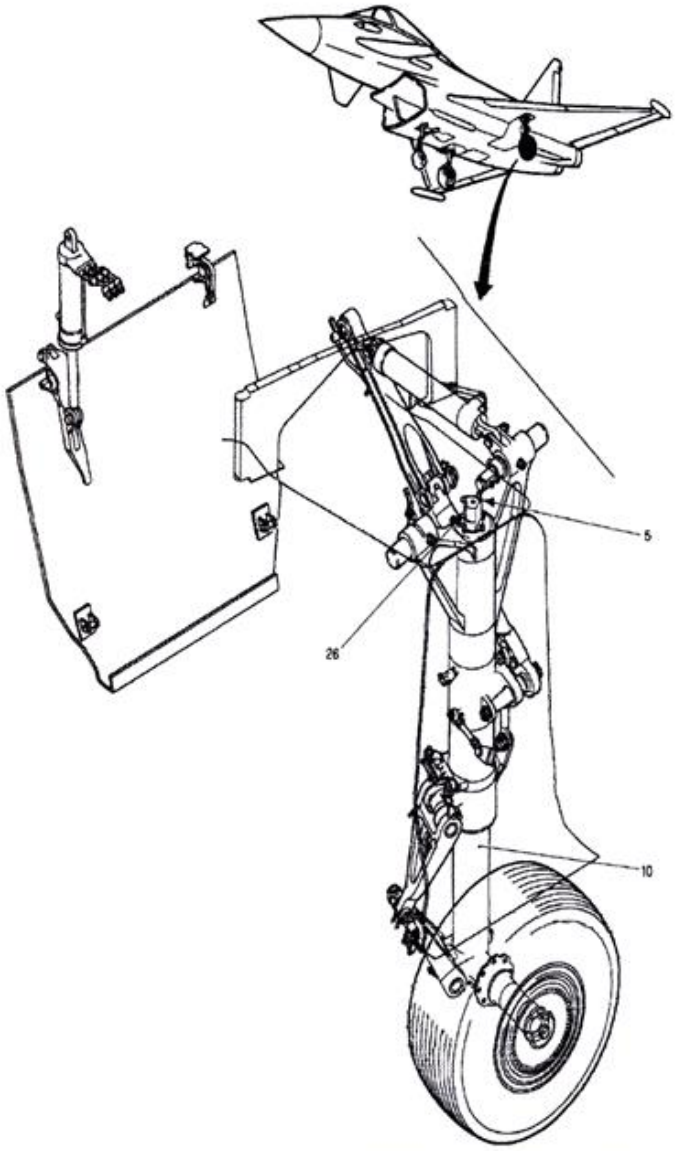
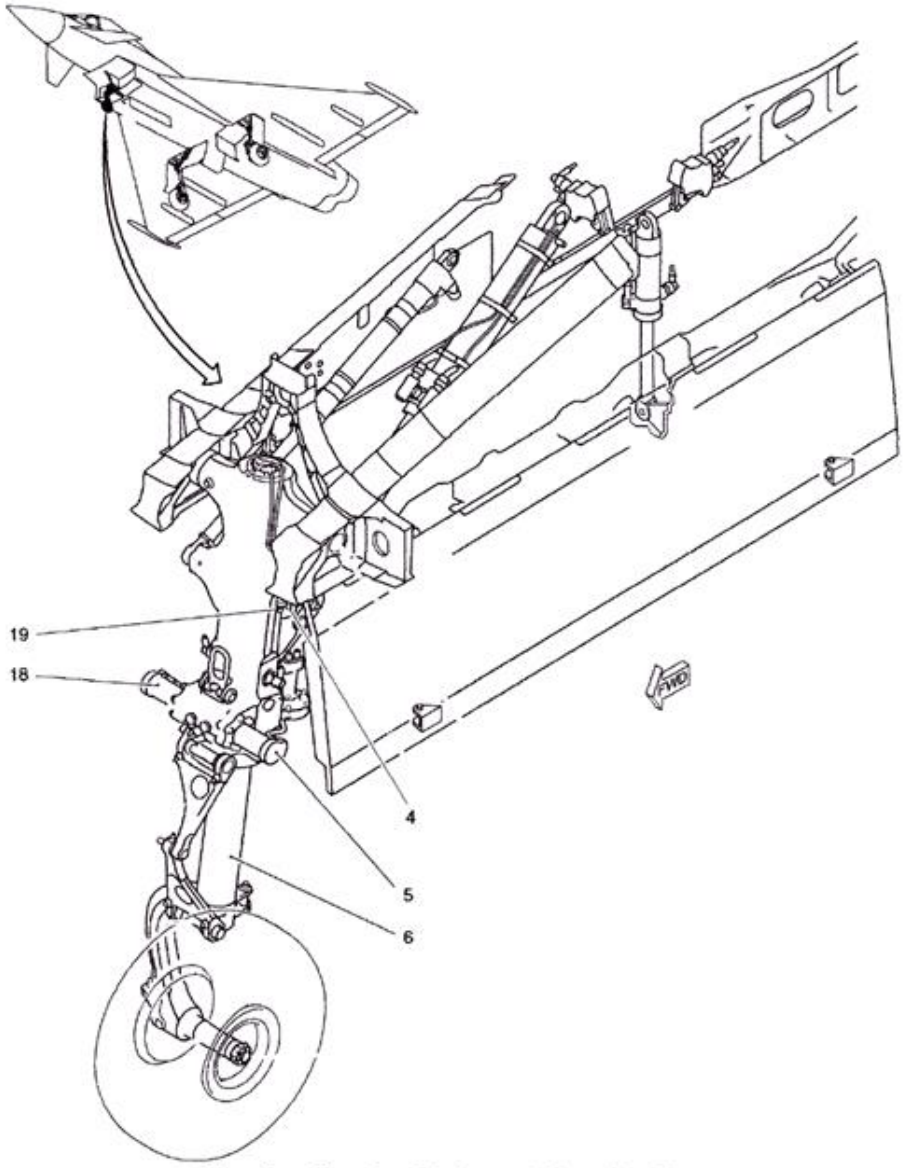
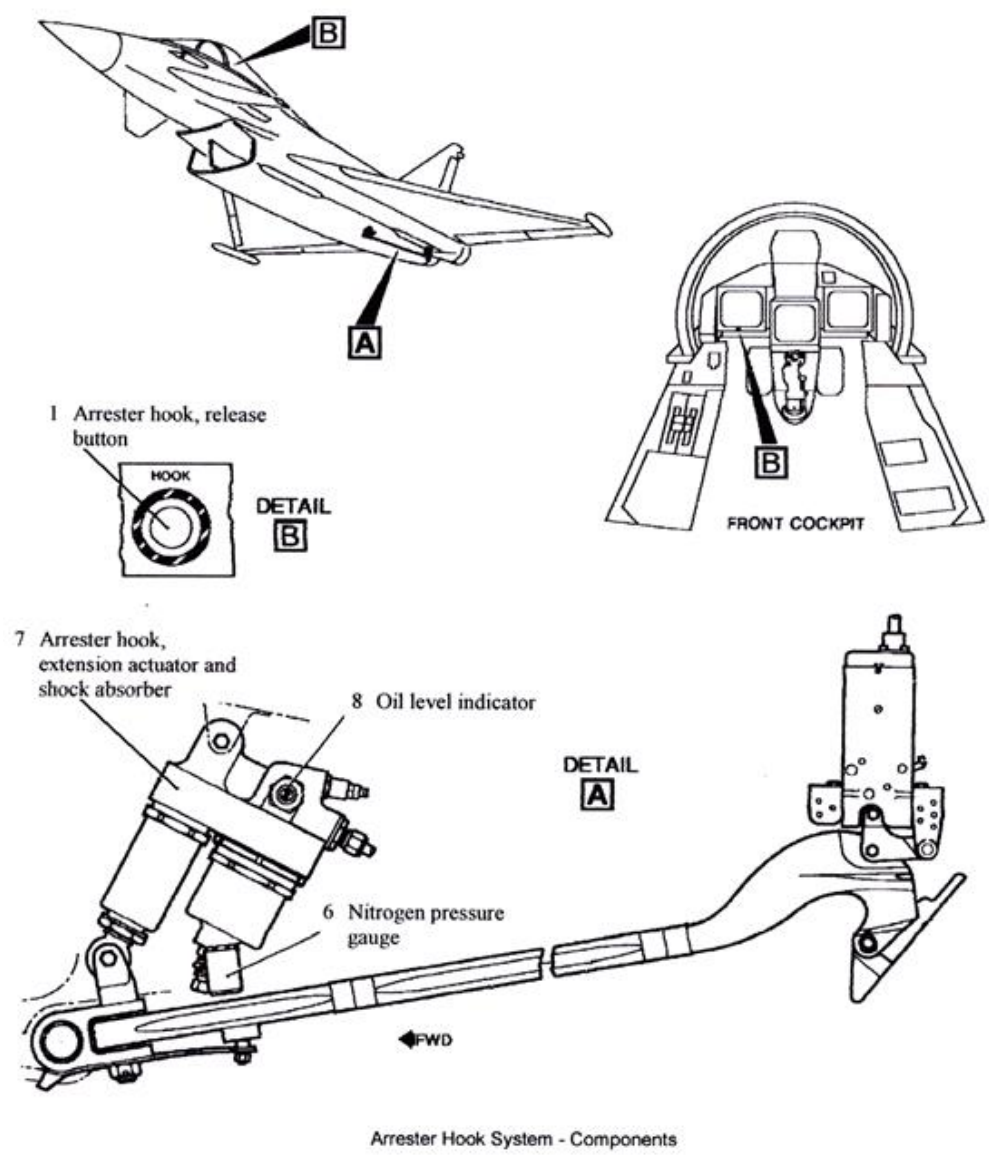


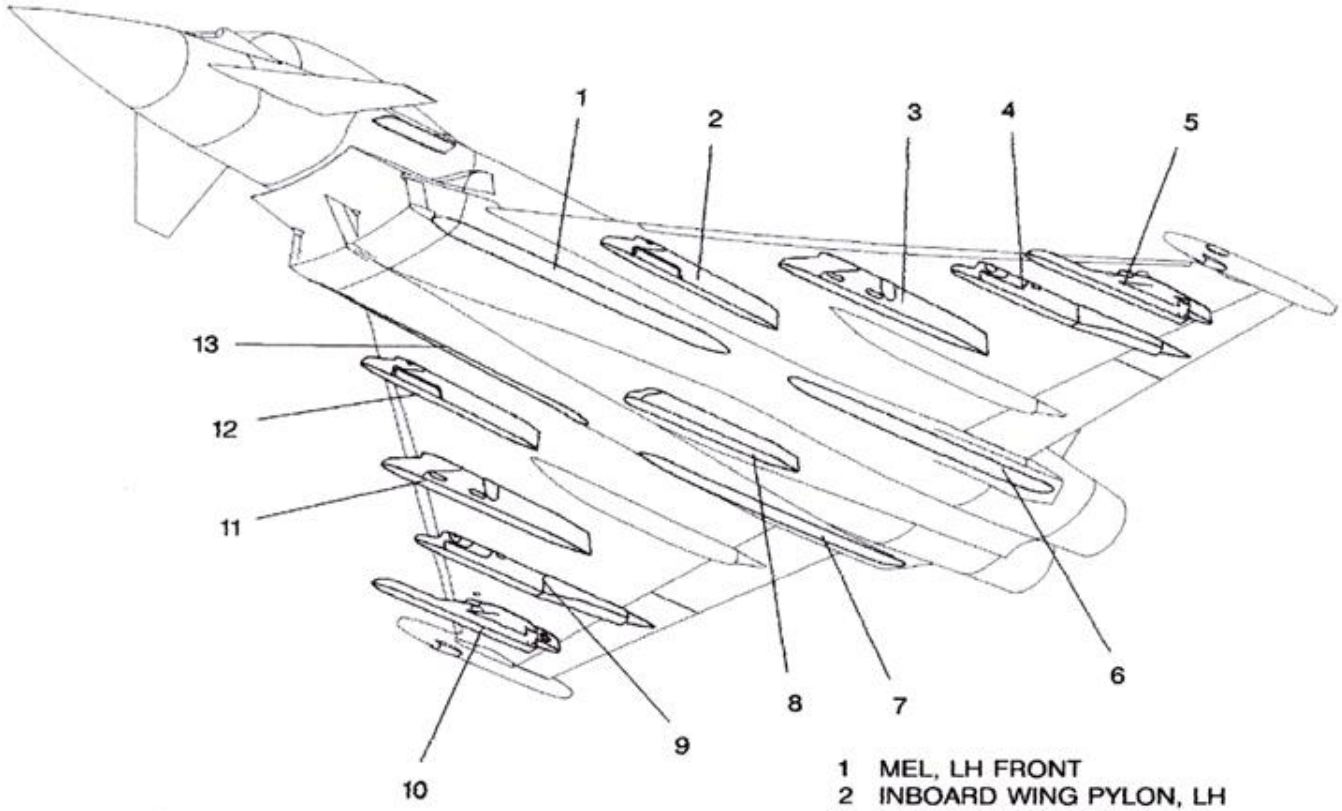

LH MLG and MLG Door Equipment - Location Diagram




Nose Landing Gear Equipment - Location Diagrams

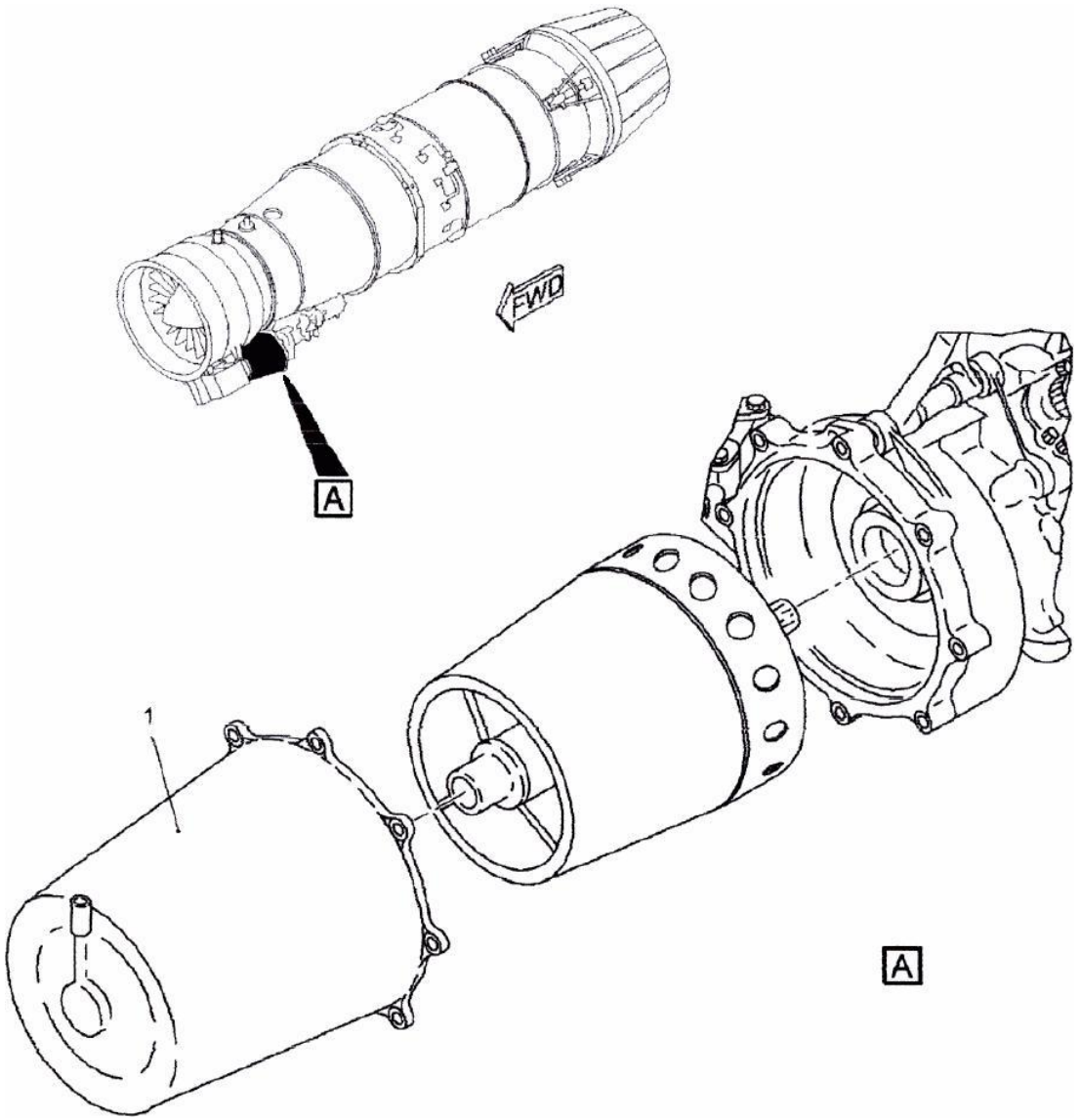



Arrester Hook System - Components




1 MEL, LH FRONT
2 INBOARD WING PYLON, LH
3 CENTER WING PYLON, LH
4 OUTBOARD WING PYLON, LH
5 ITSPL, LH
6 MEL, LH REAR
7 MEL, RH REAR
8 CENTER FUSELAGE PYLON
9 OUTBOARD WING PYLON, RH
10 ITSPL, RH
11 CENTER WING PYLON, RH
12 INBOARD WING PYLON, RH
13 MEL, RH FRONT

ACIS - Location Diagram




Typhoon F2 Engine Oil Tank Location

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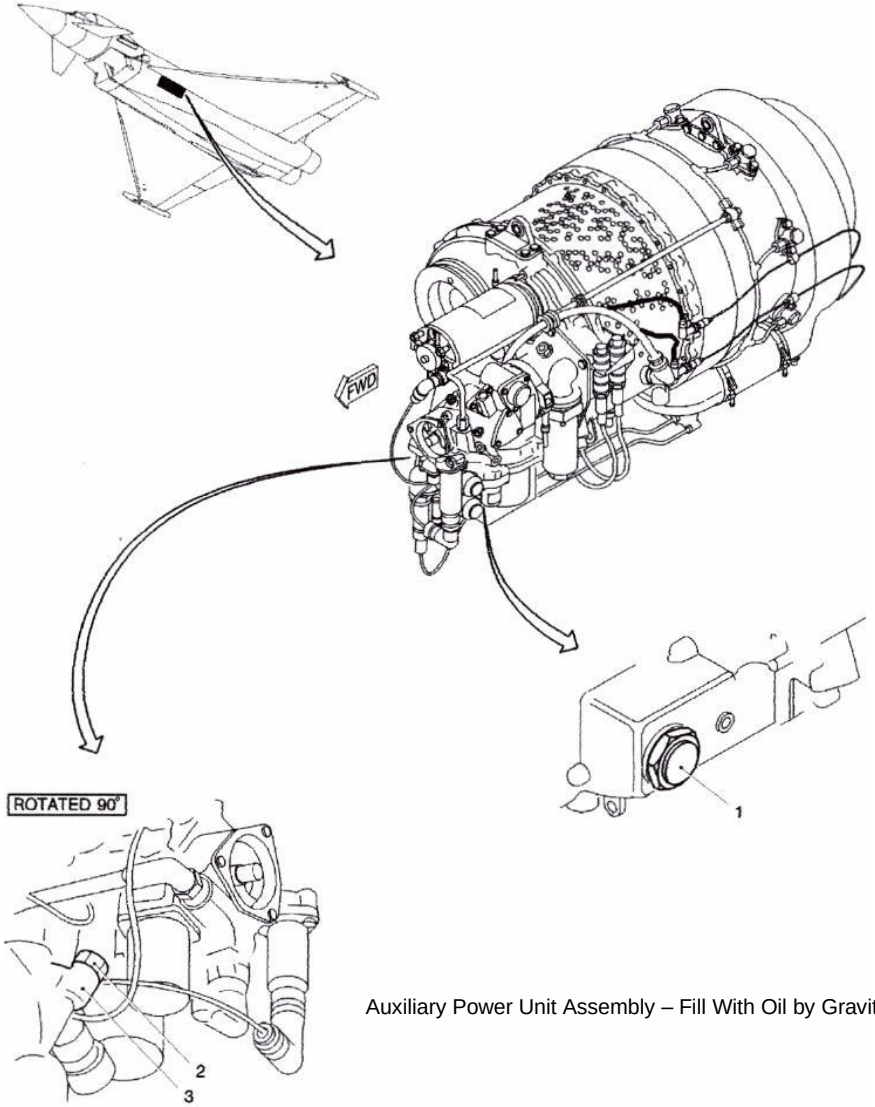


Auxiliary Power Unit Assembly – Fill With Oil by Gravity

Typhoon F2 APU Oil Tank Location

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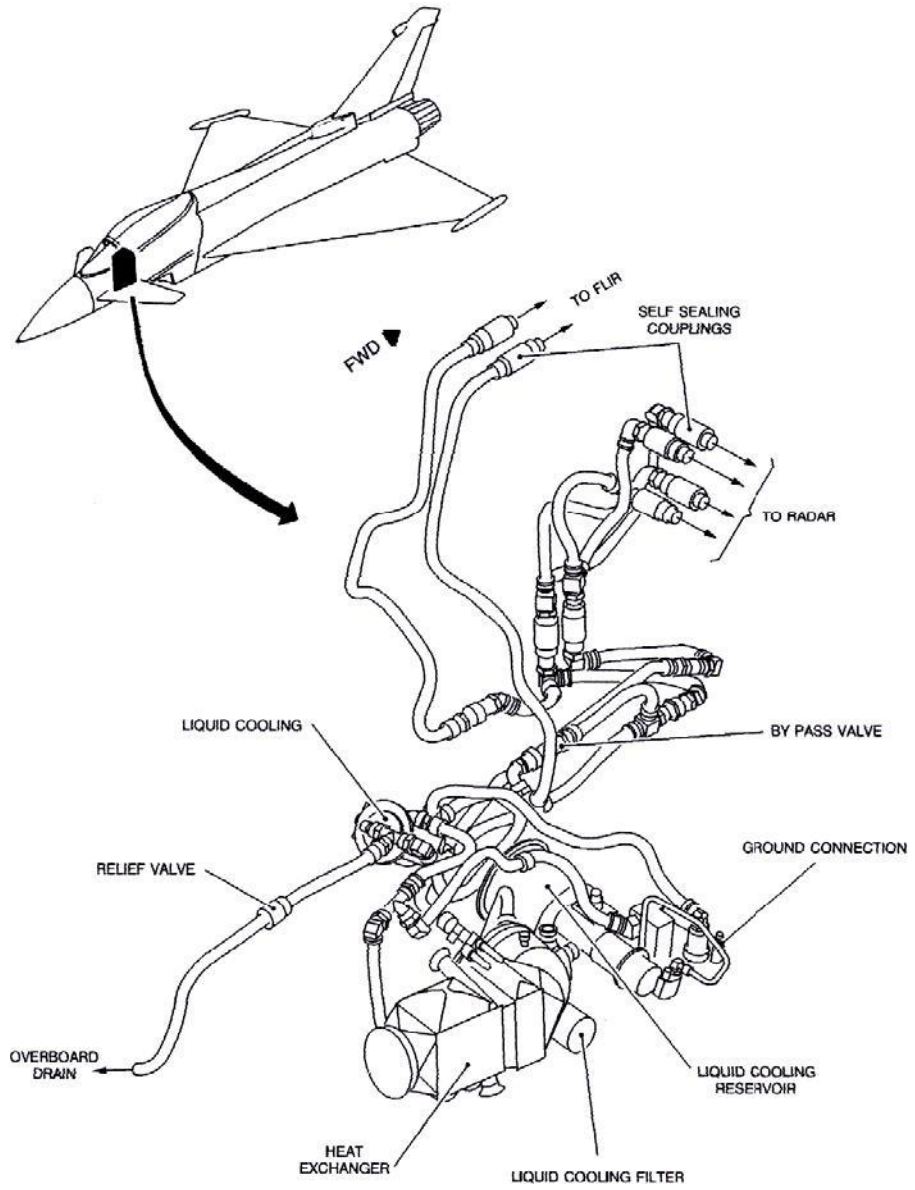
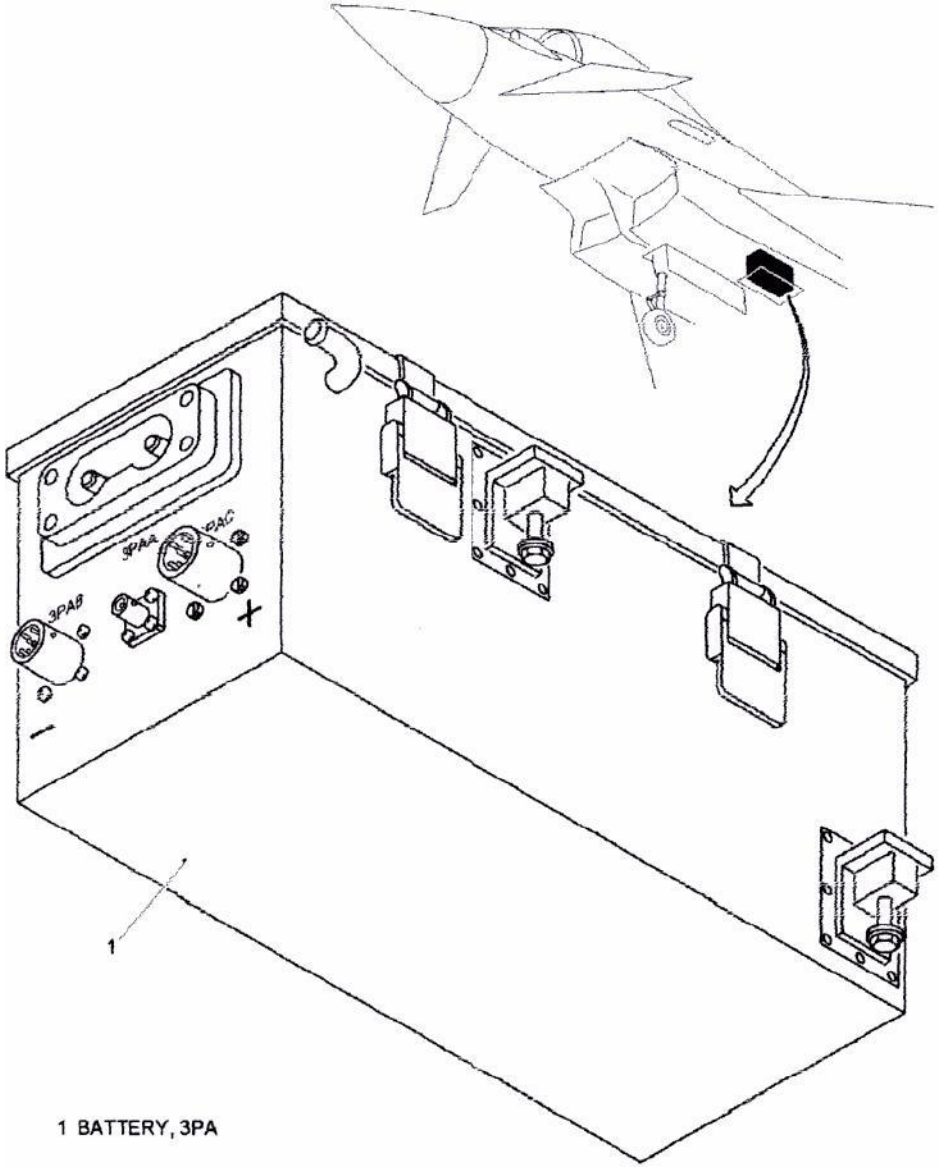
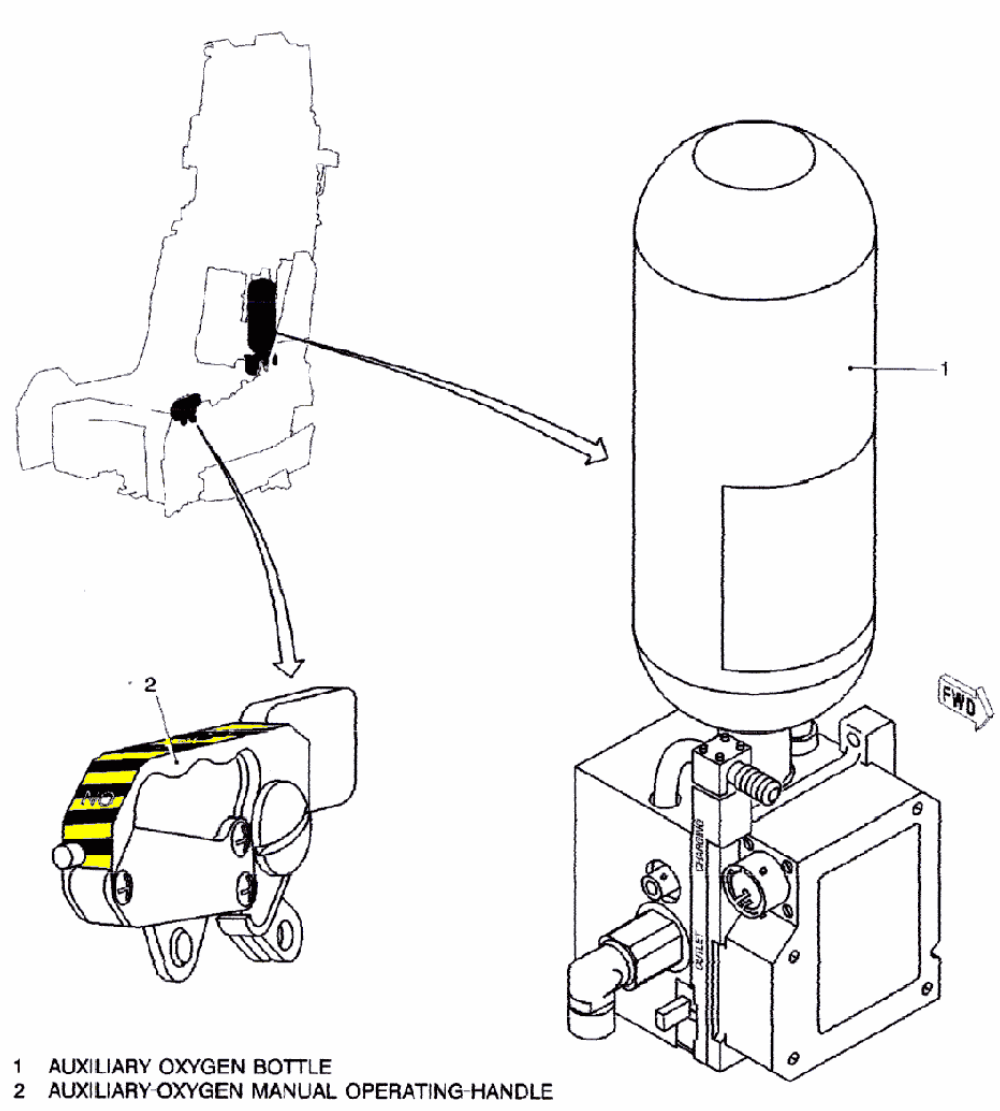



Radar/FLIR Equipment Liquid Cooling System

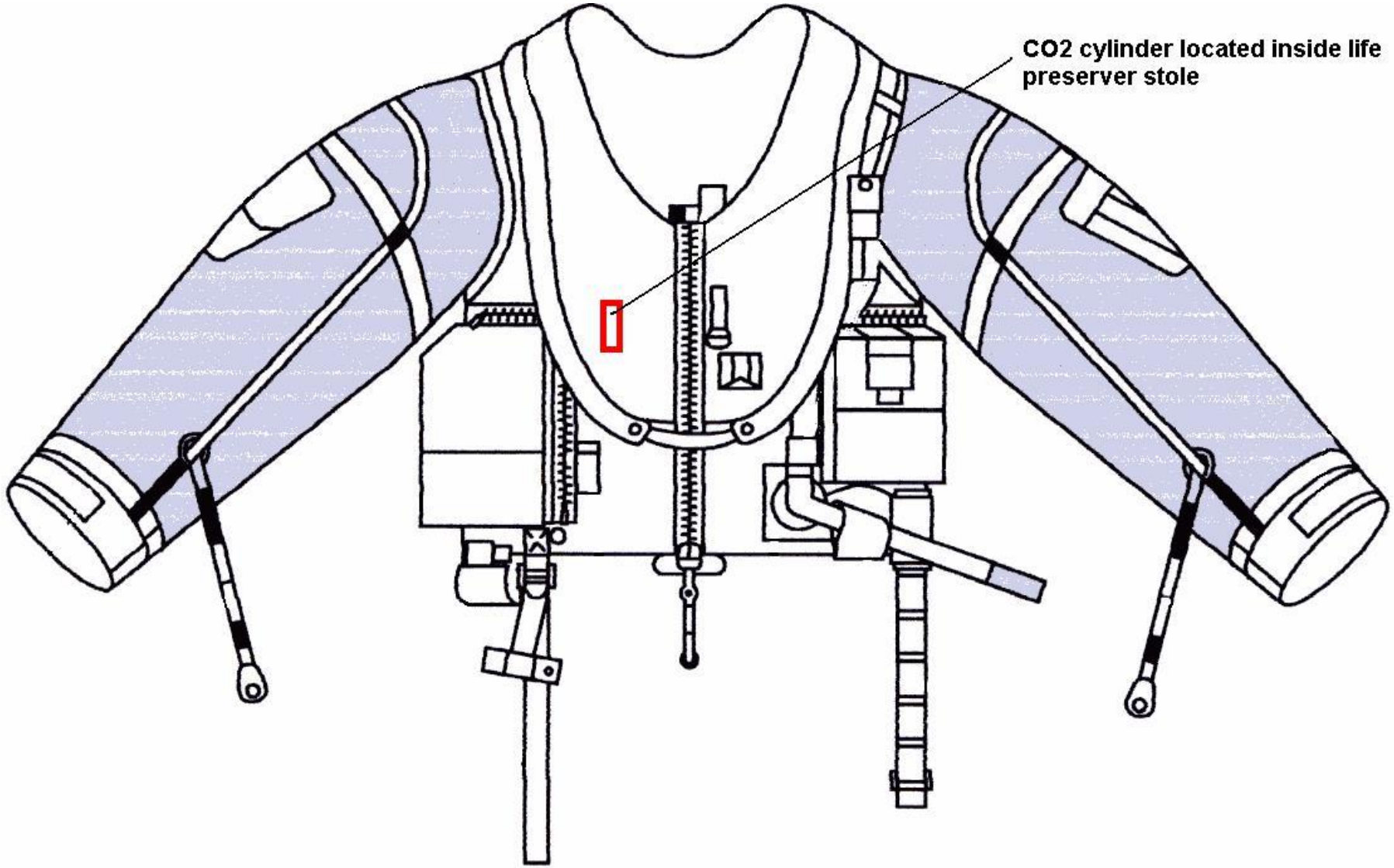


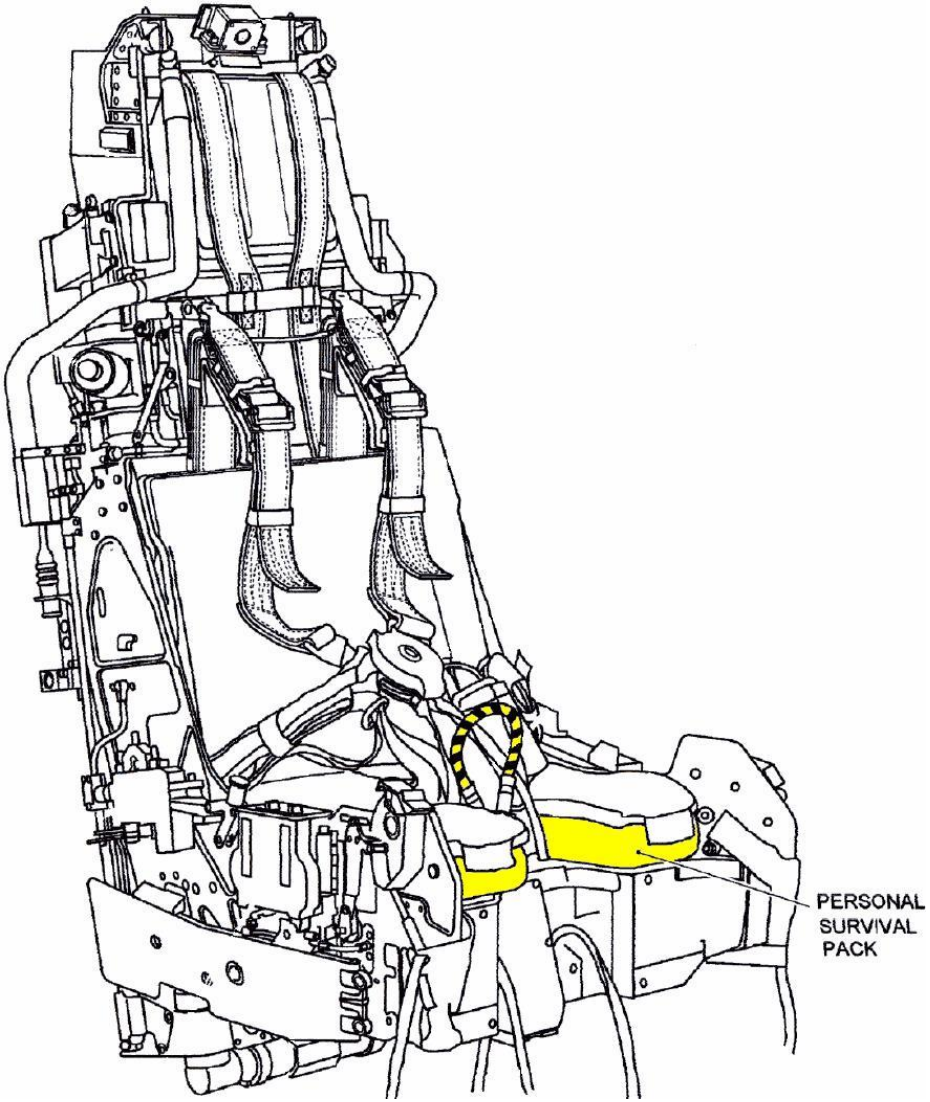

Battery Location




Auxiliary Oxygen Bottle

Flight Jacket A - Front View






Personal Survival Pack Location

**PSP Single Seat Liferaft (type 16)**
Source: http://www.aerazur.com/en/parachute-and-protection/physiological-protection.html

# SARBE® 7 - BE 549

The SARBE 7 Personal Locator Beacon is a new compact lightweight radio beacon designed for use as a military or commercial Survival aid. Produced using SMD technology and assembled using the very latest flexible manufacturing systems (FMS) this quality unit heralds a new generation of radio beacon equipment.

Activated by the removal of an operating pin - either manually or automatically by such functions as liferaft inflation or ejector seat operation, the unit transmits an internationally recognised swept-tone radio distress signal on both UHF and VHF distress frequencies.

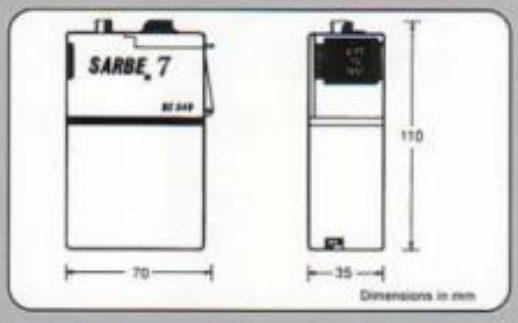
Simultaneous, omnidirectional transmission of both 121.5 and 243 MHz signals then continues automatically for a minimum of 48 hours at -20°C or longer at 0°C. This enables maximum detection opportunity by the orbiting Cospas-Sarsat satellite system and provides scene of search homing ranges of 50 nautical miles with receiving aircraft at 10,000 ft.

Built in test (BITE) facilities allows the user to check battery condition, circuit integrity and RF output to the antenna via a 'Go' green LED confidence indicator. Operated by lifting a 'Test' lever mounted on the side of the unit, SARBE 7 can be quickly tested before the commencement of a flight or at regular intervals.

An optional antenna extension lead is available for life preserver storage. On inflation of the life preserver, correct deployment of the antenna is automatically ensured even in the worst survival environment at sea.

The SARBE 7 is waterproof to a depth of 10 metres and the battery has an unused shelf life of 5 years when stored in continuous temperate conditions.

Fully approved by the CAA (Approval No. WR01012), FAA to TSO C91a and meeting NATO STANAG 3281, 5th edition, the unit is Cospas-Sarsat compatible.




## Technical Specification


**Purpose**
Personal Location Beacon.

**Stowage**
Carriage by individual aircrew members and in Personal Survival Packs or Liferaft.

**Operating Frequency**
121.5 MHz (VHF) and 243 MHz (UHF). Simultaneous operation on 121.5 MHz / 243 MHz.

**Frequency Range**
VHF range 119 MHz to 124 MHz.
UHF range 238 MHz to 248 MHz.

**Carrier Output Power**
100mW peak envelope radiated power min end of battery endurance.

**Range**
At least 50nmi at 3000 metres ASL.

**Emission Class**
A2A.

**Tone Modulation**
Tone modulated amplitude modulation (A2A).
Swept downwards over at least 700Hz between limits 1600Hz and 300Hz.
Modulation duty cycle between 33 and 55%.
Modulation factor between 0.85 to 0.99.

**Modulation / carrier keying**
2 sweep per transmission.
Sweep rate 2 to 3Hz.
Carrier duty cycle 1:2 nominal. (0.75s on and off period of 1.5s).
'MARK' period 0.75s nominal, 'SPACE' period 1.5s nominal.
A factory fit link option for continuous carrier of 1:1 duty cycle is available.

**Occupied Bandwidth Limits**
VHF 30% power, within 30Hz. UHF 30% power, within 60Hz.

**Operational Endurance**
At least 48 hours at -20°C using battery Part No. 100443 (Lithium Manganese Dioxide) OR at least 24 hours at -40°C using battery Part No. 100444 (Lithium Sulphur Dioxide).

**Operating Temperature Limits**
-20°C to +55°C when using Lithium Manganese Dioxide battery.

**Storage Temperature Limits**
-40°C to +55°C non operating.

**Humidity Limits**
Up to 100% over -30°C to +50°C operating.

**External Pressure**
Waterproof to a depth of 10 metres.

**Construction**
Cast single unit, with removable backplate and battery pack.

**Operation**
Manual or automatic activation.

**Release Mechanism**
Metal pin, released by pulling attached strap or steel lanyard. Compatible with auto activation on aircraft ejector seat separation or liferaft inflation.

**Dimensions**
Length: 110mm. Width: 70mm. Depth: 35mm.

**Weight (max)**
Beacon and battery 450 gms.

**Colour**
Signal yellow.

**Antenna**
Omnidirectional 1/4 - wavelength 243 MHz. Loaded 1/4 - wave at 121.5 MHz. Vertical, either equipment or life preserver mounted.

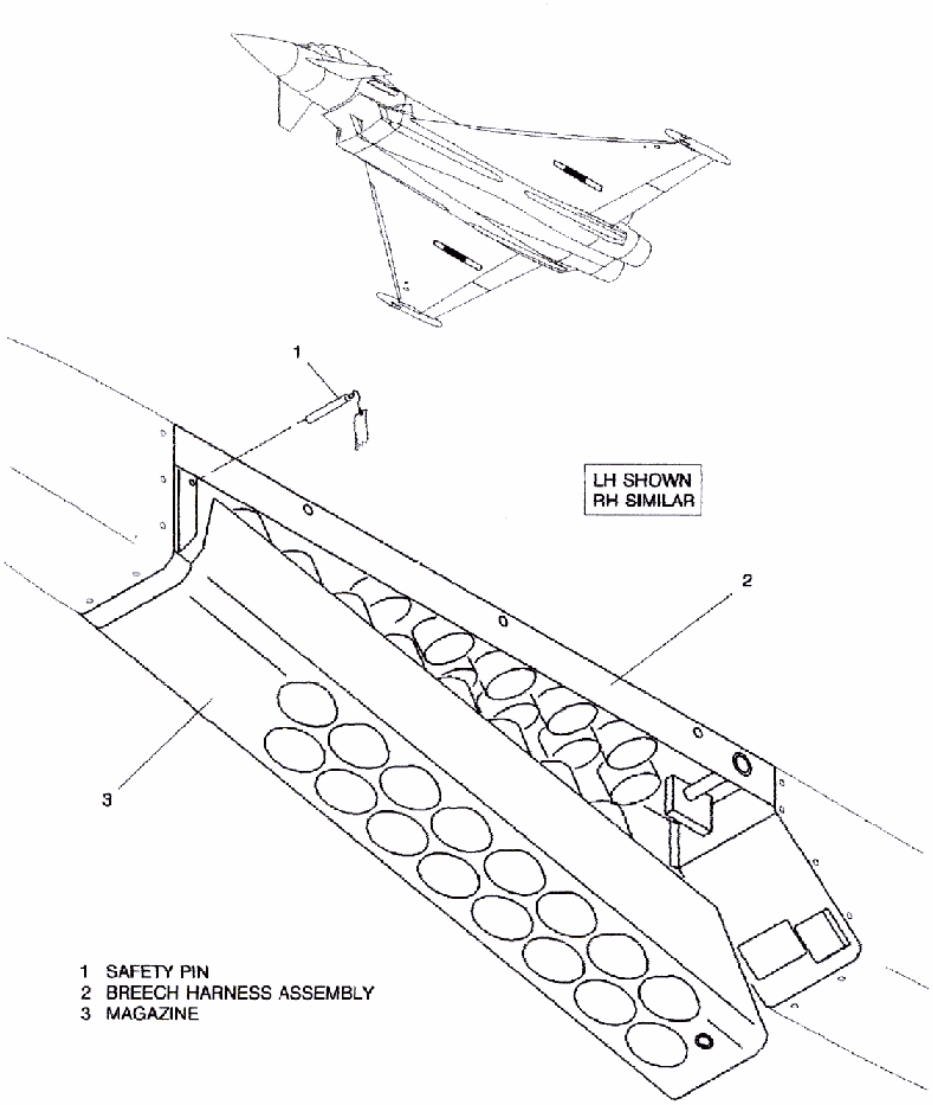
**Battery**
Type: Lithium Manganese Dioxide ($LiMnO_2$) Part No. 100443
Emf (nominal) 12v.

**Options**
TX carrier keying = 1:1 or continuous carrier.

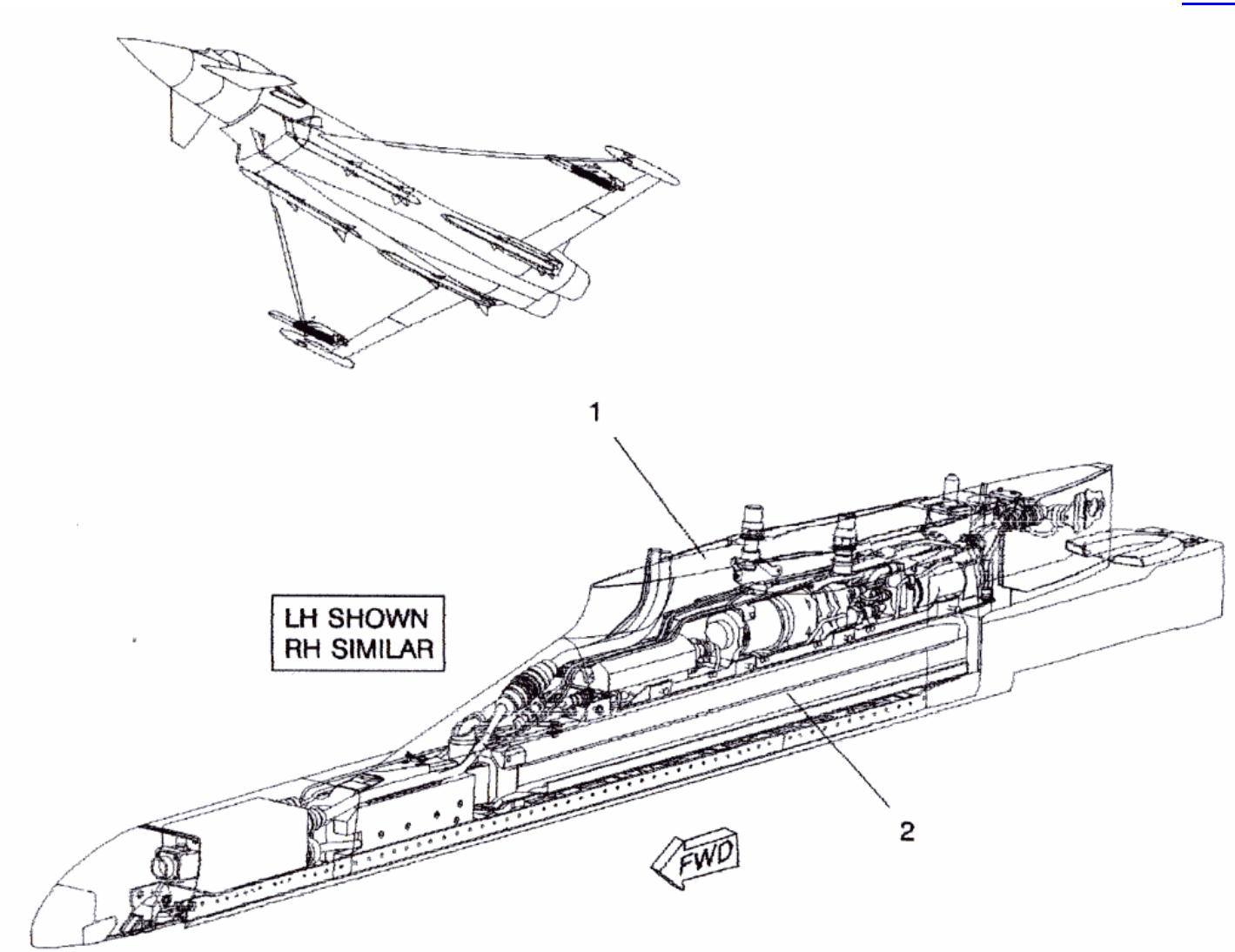
**Accessories**
Flexible Sleeve Antenna attachment, Part No. 100446.
Ejector seat activating pin with nylon cord attachment, Part No. 100453.

**Design Specification**
NATO STANAG 3281, 5th edition (Relevant Sections), relevant sections of NATO STANAG 7007 edition 2, CAA CAP 208 Volume 1.
EUROCAE - ED-62, EUROCAE - ED14C, RTCA/DO-183, DEF STAN 07-55.

**Approvals** CAA Approved REF: WR01012 and FAA to TSO C91a.




Flare dispenser




1 INTEGRATED TIP STUB PYLON LAUNCHER (ITSPL)
2 CHAFF DISPENSER

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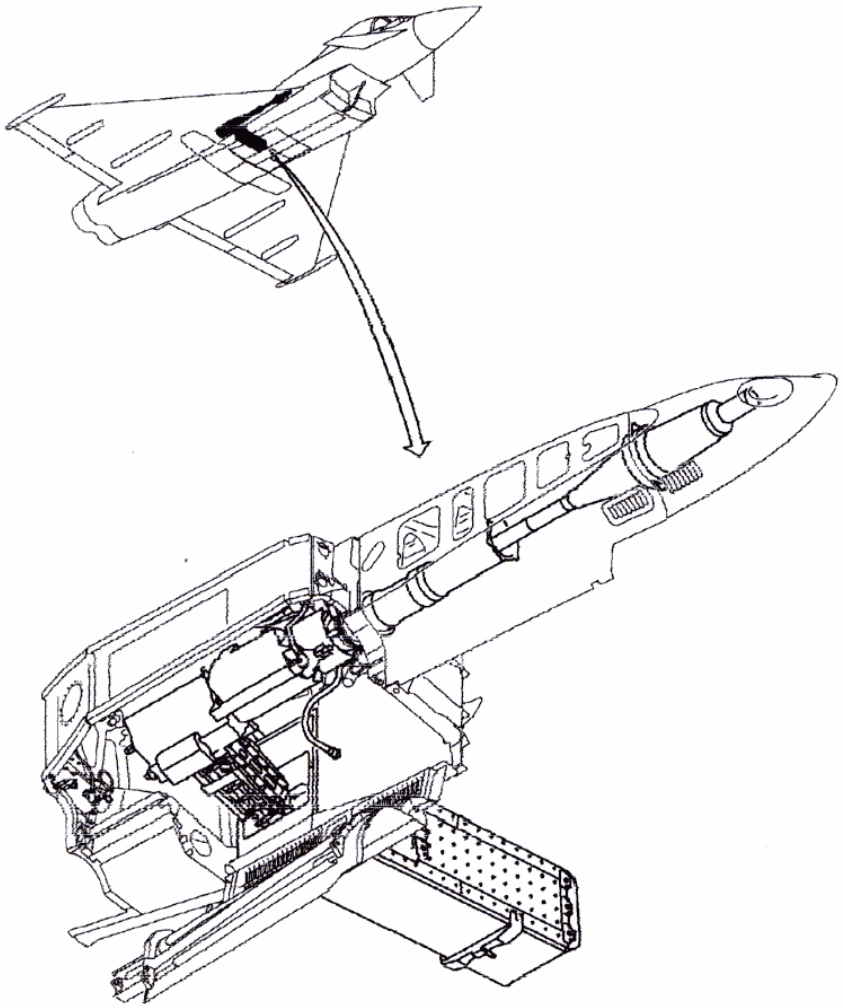
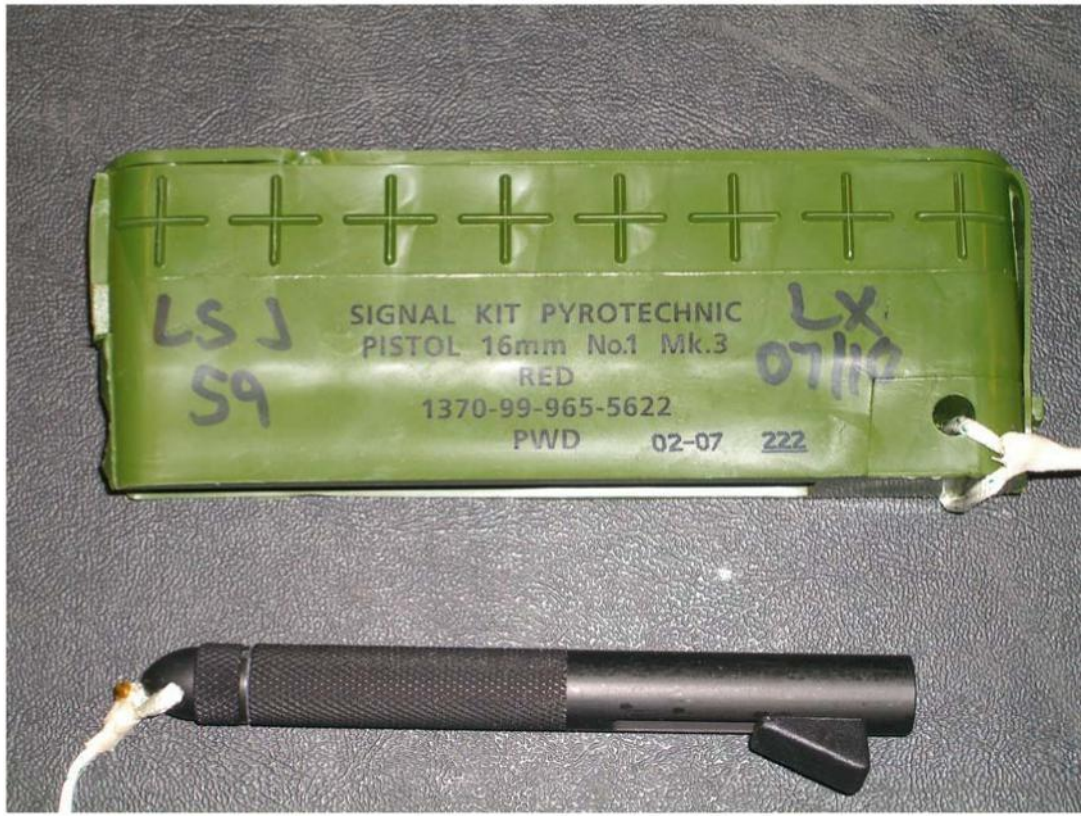


Gun System - Location




**Personal Pyrotechnic Signal Kit**

Sources: AP 108F-0114-1 2nd Ed (Aug 88 (Amdt 3))
AP 108F-0836-123 (Life Preserver Aircrew Mk 41)

The pyrotechnic signal kit, comprising eight cartridge flares and a pencil sized projector is stowed in the bottom of the section of the survival aids pocket.

The red cartridge flares, which are stowed in a green container, can be fired to a height of 99m and will burn with an intensity of 4,800 cd.

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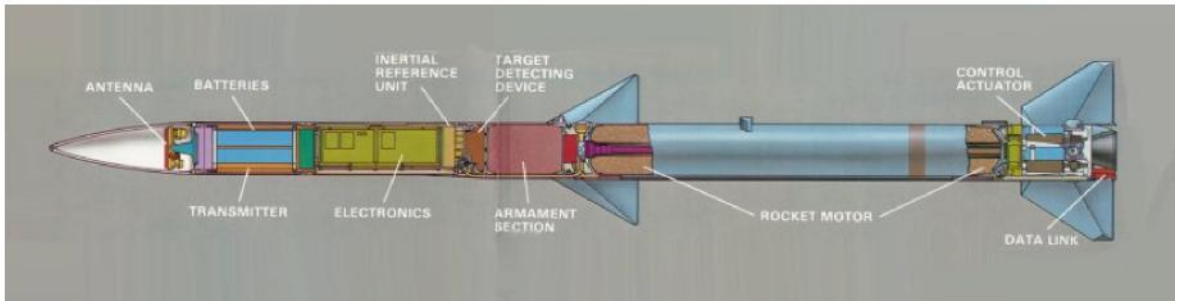
# Advanced Medium Range Air-to-Air Missile (AMRAAM)

AMRAAM can be used in all weather conditions and is scheduled to be operational with the RAF into the next decade. The missile is equipped with a radar proximity fuse, which detonates the high-explosive fragmentation warhead at a preset distance from the target.

| | |
|---|---|
| Length | 3.66M |
| Diameter | 17.8CM |
| Fin span | 63.5CM |
| Weight | 157KG |

Source:

http://www.raf.mod.uk/equipment
http://www.designation-systems.net/dusrm/m-120.html



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# Advanced Short-Range Air-to-Air Missile (ASRAAM)

The AIM-132 ASRAAM is a high speed, highly manoeuvrable, heat-seeking, air-to-air missile. Built by MBDA UK Ltd, the missile is designed as a ‘fire-and-forget’ weapon. It is powered with solid propellant rocket motor.

| | |
|---|---|
| Length | 2.73M |
| Diameter | 16.8 CM |
| Fin span | 45CM |
| Weight | 100KG |

Source:

http://www.raf.mod.uk/equipment
http://www.militaryimages.net

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# Brimstone

This advanced radar-guided weapon is derived from the US Army Hellfire AGM-114F missile and is deployed in RAF service on a pylon-mounted launching rack that will contain three missiles. It is powered by a rocket motor and can seek and destroy targets at long range.

It is designed to be carried by the Tornado GR4/A, Harrier GR9 and Typhoon F2.

| | |
|---|---|
| Weight | 48.5KG |
| Length | 1.8M |
| Diameter | 17.8CM |

Source: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Brimstone_missile
Picture: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Brimstone_missile

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# Storm Shadow

Conventionally Armed Stand Off Missile (CASOM)

This long-range air-launched and conventionally-armed missile equips RAF Tornado GR4/A and Harrier GR7, Harrier GR9 and Typhoon F2.

Storm Shadow is equipped with a powerful UK-developed warhead and is designed to attack important hardened targets and infrastructure, such as buried and protected command centres. After release, the wings deploy, and the weapon navigates its way to the target.

| | |
|---|---|
| Weight | 1230 KG |
| Length | 5.1M |
| Diameter | 1M |

Warhead 450KG

Source: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Storm_Shadow

Picture: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Storm_Shadow

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# ALARM

The Air Launched Anti-Radiation Missile (ALARM) - used by Typhoon F2, Tornado GR4 and some specially modified Tornado F3

Combinations of between two and seven missiles can be carried on each aircraft.

Length 4.24M
Diameter 23CM
Wing Span 73CM
Weight 268KG

Source:

http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/ALARM

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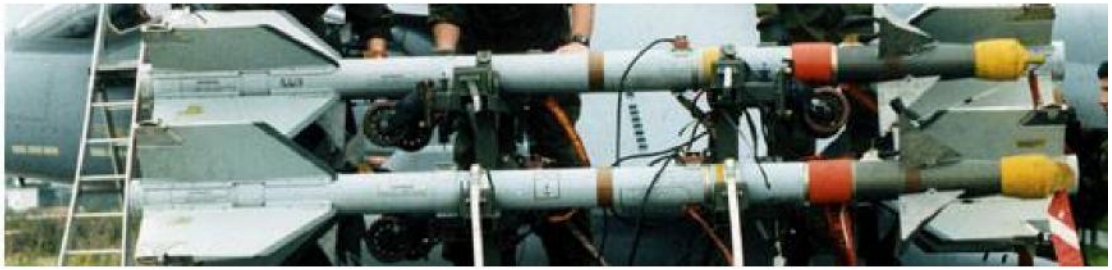
# AIM-9 Sidewinder

The Sidewinder AIM-9 is a supersonic, heat-seeking, short range, ait-to-air missile capable of being launched from a vast array of aircraft types. The sidewinder's main components are an infrared (IR) homing guidance section, an active target-detector, a high-explosive warhead and a rocket motor.

Data
Length 2.87 M
Diameter 12.70 CM
Weight 87 KG

Sources:

Text - www.raf.mod.uk
Pictures www.af.mil

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# Paveway II & Paveway III

The Paveway II laser-guided bomb (LGB) composed of a standard UK 450kg bomb with a computer control group fitted to the nose, supporting a laser seeker head and steerable fins. A tail unit is fitted with fins that deploy after launch from the aircraft.

Paveway III is an upgraded LGB and carries a 900kg penetrator warhead.

Source: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Paveway

Picture: http://www.raf.mod.uk/equipment
http://en.wikipedia.org/wiki/Paveway

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# Paveway IV

Used on Harrier GR9, Tornado GR4 and Typhoon F2. Use with Joint Combat Aircraft (JCA) is planned. Fitted with a 225kg warhead.

Source: http://www.raf.mod.uk/equipment

Picture: http://www.raf.mod.uk/equipment

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# Enhanced Paveway (EPW)

EPW II is fitted with a 450kg general-purpose warhead and EPW III is fitted with a 900kg class penetration warhead. Harrier GR7 can carry the EPW II and both weapons are carried by Tornado GR4.

Both EPW II and EPW III are based on the laser-guided bombs Paveway II and Paveway III respectively, already in RAF service, and use the same warheads and fin sections. However, the EPW weapons have a modified guidance section and wiring to accommodate a Global Positioning System Aided Inertial Navigation System (GAINS).

Source: http://www.raf.mod.uk/equipment

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# Potassium Hydroxide

## General information

Aqueous potassium hydroxide is employed as the electrolyte in alkaline batteries based on nickel-cadmium and manganese dioxide-zinc. Potassium hydroxide is preferred over sodium hydroxide because its solutions are more conductive.

## Hazards

Potassium hydroxide is extremely corrosive. If inhaled the effects it can cause range from mild irritation to serious damage of the upper respiratory tract, depending on the severity of exposure. High concentrations can cause lung damage. Contact with the skin can cause irritation or severe burns, if ingested burns may occur to the mouth, throat and stomach and a dose of 5 grams or more may cause death. Contact with the eyes will cause tearing, redness, swelling. Greater exposure may cause severe burns with possible blindness. Potassium hydroxide can chemically react with metals such as aluminium, zinc, copper, ect to release hydrogen gas which can form explosive mixtures with air.

## Basic precautions

Avoid any contact with bare skin/eyes. In the event of a fire, wear full protective clothing and self-contained breathing apparatus with full face piece operated in the positive pressure mode.

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# Lithium Batteries

## General information

The main RAF uses of Lithium batteries are in some explosive armament stores, NBC monitoring instruments, emergency lighting systems, sonobouys, aircrew ventilators, night vision devices, cockpit systems and in some computers: in some equipment batteries may be hard wired to printed circuit boards. Lithium batteries are made up of cells having lithium metal anodes; several substances may be used as cathodes. Because lithium reacts readily with water, lithium batteries use non-aqueous organic and inorganic electrolytes.

## Hazards

The hazards of lithium batteries arise mainly from abuse, such as connection to other power sources, attempted recharging, forced discharge, short circuit, and incinerating, overheating or physical damage. Abuse will generally cause overheating and venting and may cause cells to explode. Physical damage to cells will allow the release of hazardous material which may ignite spontaneously. The degree of risk depends upon the cell size, the number of cells in a battery, inbuilt design features and the usage of the battery. Even where no ignition or explosion takes place, there may be hazards from the release of toxic or irritant materials.

## Basic precautions

The most likely cause of personal injury is by contamination from the internal components of damaged lithium cells or batteries, therefore protective clothing and breathing apparatus if required, should be worn if entering the hazard area.

## Toxic Gas Emission

The following was extracted from an article published by the Marine & Coastguard Agency (IMCA Safety Flash 01/03 February 2003). To summarise the event, a transponder, which had been submerged in the sea at a depth of 600m below the surface, was recovered to a vessel and, after two hours, the safety relief valve on the transponder opened and a whitish cloud became visible. It was discovered that a gas had been created by the chemical reaction saltwater leaking into the transponder and coming into contact with the lithium batteries. The gas was found to be toxic, comprising of sulphur dioxide and hydrogen chloride.

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# Cadmium

## General information

Cadmium is a silver-white metal with a bluish tinge and is used as an anti-rust plating material and in some welding and soldering alloys. Cadmium is also alloyed with copper in some electrical cables, combined with selenium in paints and colouring agents for plastics and used as an electrode material in nickel-cadmium batteries.

## Hazards

The most serious hazards caused by cadmium arise when cadmium plated metal is heated sufficiently to generate fumes, e.g. cutting or drilling, welded or burnt. Cadmium fumes have no distinctive smell or immediate effects, even in fatal concentrations and are therefore very dangerous. The symptoms of acute poisoning by cadmium fumes or dust, which may not appear for several hours after exposure, are tightness of the chest, uncontrollable coughing, shortness of breath, headaches and shivering; severe overexposure may lead to death.

## Basic precautions

If cadmium fume has been created, due to burning or dust creating activities, the operator should wear appropriate protective clothing and breathing apparatus as required if entering the hazard area.

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# Man-Made Mineral Fibre

## General information

MMMFs appear in a wide range of products and are usually sub-divided into the following categories:

(1) Mineral wools (also known as insulation wools).
(2) Ceramic fibres (also known as refractory fibres).
(3) Special purpose fibres.
(4) Continuous filament fibres.

MMMFs and related composite materials have many uses in automotive, aviation and industrial applications. In RAF engineering, such products are to be used only when specifically called for in maintenance manuals, maintenance procedures or other instructions issued by engineering authorities.

## Hazards

All materials used in aircraft construction will offer some kind of toxic hazard during and following a fire or crash situation. Probably the most hazardous in terms of toxicity are MMMF. The fibres will support a flame at 195°C and release highly toxic vapours at very low temperatures - cyanide is released at 150°C. The smoke and vapour given off from the resins and bonding agents are highly toxic, causing irritation and severe respiratory problems which could have long term effects.

MMMFs may cause eye and skin irritation and excessive conditions may cause irritation of the upper respiratory tract. Drilling, filling, sawing or abrading of composite material will introduce dust, possibly of microscopic size, into the atmosphere; although mainly a nuisance, this dust may contain toxic elements of epoxides and other bonding materials. Some MMMFs, particularly carbon fibres, are electrically conductive and care is needed whilst working near unprotected electrical conductors.

## Basic precautions

Firefighters responding to aircraft fires involving MMMF are to wear the same protective clothing as they would when responding to any other aircraft fire. Additionally, they shall wear self-contained Breathing Apparatus (BA) when they are in close proximity or actually exposed directly to the smoke, fumes and gases from burning MMMF or airborne carbon fibres as a result of abrasion or damage. Recovery crews are advised to wear P3 filtering quarter-masks where respirable fibres may become airborne. Stout gloves are to be worn when handling shards of MMMF.

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# Plastics

## General information

There are many types of plastic materials in service. These are typically used as electrical insulation and heat shrink products, tank and pipe linings, protective coatings, electronic components, aircraft trim and furnishings, protective clothing, composite materials and packaging materials.

## Hazards

When handled normally, plastics can be regarded as chemically inert but health hazards can arise from the following causes:

Heat. All plastics decompose if subjected to excess heat or naked flames and when heated to degradation will produce decomposition products dependent on the base polymers used. These products, in the form of fumes, may include alcohols, aldehydes, carbon dioxide, carbon monoxide, carboxylic acids, fluorinated hydrocarbons, hydrocarbons, hydrogen bromide, hydrogen chloride, hydrogen fluoride, silicon dioxide and oxides of nitrogen, phosphorous and sulphur.

Solvents. Some plastics will decompose in contact with strong solvents, such as methylene chloride or trichloroethylene and will give off irritant fumes and toxic vapours.

Dust. Finely divided plastic particles or dust from drilling or cutting processes may pollute the working environment, enabling decomposition products to be created more readily.

## Basic precautions

Treat all plastics as hazardous, if they have been subjected to heat/naked flames, solvents or dust creating activities. Wear appropriate protective clothing and breathing apparatus as required if entering the hazard area.

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# Titanium

## General information

Titanium is a chemical element with the symbol Ti and atomic number 22; and is silver grey in colour. Its two most useful properties are its resistance to corrosion and the highest strength-to-weight ratio of any metal. In its unalloyed condition, titanium is as strong as some steels, but 45% lighter.
Theses factors along with its ability to withstand moderately high temperatures without creeping, titanium alloys are used in aircraft, armour plating, naval ships, spacecraft, and missiles. For these applications titanium alloyed with aluminium, vanadium, and other elements is used for a variety of components including critical structural parts, fire walls, landing gear, exhaust ducts (helicopters), and hydraulic systems. In fact, about two thirds of all titanium metal produced is used in aircraft engines and frames.

## Hazards

Titanium and titanium base alloys are non toxic and safe to handle in solid forms. As a powder or in the form of metal shavings, titanium metal poses a significant fire hazard and when heated in air, an explosion hazard. The dust is also harmful if inhaled and can cause a dry throat, coughing and shortness of breath.

## Basic precautions

If entering a hazard area where titanium dust may be present, protective clothing and breathing apparatus should be worn. When fighting titanium based fires, Class D dry powder fire fighting agents should be used as water and carbon dioxide based methods are ineffective on burning titanium.

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## HSIS Safety Data Sheet

| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 9130992201036 | 9130 | 99 | 2201036 |
| **Supply Description** | | | |
| **SDS Version** | 2 | | |
| **Item Name** | Turbine Fuel Aviation | | |
| **Kit Reference** | | | |
| **Other Description** | NATO F-34 Avtur FS11 | | |
| **Commercial Name/Product No*** | Shell Jet A-1 with AL48 | | |
| **Additional Product ID** | | | |
| **SDS Date** | 12 February 2009 | | |
| **Manufacturers SDS Reference** | V20002 rev 23 12 2002 | | |
| **Supplier** | Shell UK Oil Products Ltd | | |
| **Address** | Stanlow Manufacturing Complex PO Box 3 Ellesmere Port | | |
| **Post Code** | CH65 4HB | | |
| **Suppliers Business Telephone Number** | 0151 350 4000 | | |
| **Emergency Tel No** | 0151 350 4595 | | |
| **IPT** | | | |
| **Army** | NK | | |
| **Navy** | NK | | |
| **RAF** | 34B | | |
| **REACH Reference Number** | | | |
| **NCage** | KD4F0 | | |
| **Status Comment** | | | |
| **Other Information** | | | |
| **Other Information** | | | |
| **Chemical Content** | Kerosine Unspecified <100 % Diethylene glycol monomethyl ether <0.15% | | |
| **Related SDS** | | | |

Data Sheet No. V20002 Revision : 23 12 2002 REPLACES V20002 : 09 12 99

This data sheet has been prepared in accordance with the requirements of the Data Sheet Directive 91/155/EEC.

**RECOMMENDED USES**

Shell Jet A-1 with AL48 is recommended for use as :

fuels for aviation turbine engines designed to run on these fuels when these engines are fitted to aircraft.

If Shell Jet A-1 with AL48 is used for a purpose not covered in this section, Shell UK Ltd would be grateful to receive information on the application.

**KNOWN MISUSES/ABUSES**

Shell Jet A-1 with AL48 is not to be used as :

solvents or cleaning agents ; as diesel fuel additives to prevent waxing in cold weather ; or for lighting or brightening tires. They should never be siphoned by sucking the liquid up a tube by mouth, or stored near sources of heat or ignition.

The disposal of Shell Jet A-1 with AL48 to soil, watercourses and drains is a legal offence.

## 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

| | |
|---|---|
| **PRODUCT :** | **SHELL JET A-1 WITH AL48** |
| **COMPANY :** | **SHELL UK OIL PRODUCTS LIMITED** |
| **TECHNICAL CONTACT:** | **PRODUCT HSE DEPARTMENT** |
| **ADDRESS :** | **STANLOW MANUFACTURING COMPLEX, PO BOX 3, ELLESMERE PORT, CH65 4HB** |
| **TELEPHONE :** | **0151-350-4000** |
| **EMERGENCY TELEPHONE NUMBER :** | **0151-350-4595** |

## 2: COMPOSITION/INFORMATION ON INGREDIENTS

Shell Jet A-1 with AL48 is a preparation manufactured from kerosines derived from crude petroleum, and additives, which do not impart any additional hazard to the finished product.

The hydrocarbon components will include straight-run kerosine, and may contain contain cracked kerosine components. The

following components, which have health effects, are present at significant concentrations.

| CONC. | COMPONENT | EINECS | CLASS | RISK PHRASES |
|---|---|---|---|---|
| < 100% | Kerosine Unspecified | 307-033-2 | | R10 Flammable |
| | | | Xn | R65 Harmful: may cause lung damage if swallowed |
| | | | Xi | R38 Irritating to skin |
| | | | N | R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment |
| <0.15% | Diethylene glycol monomethyl ether | 203-906.6 | Xn | R63 Possible risk of harm to the unborn child |

Exposure limit values exist for the following constituents:

None.

## 3: HAZARD IDENTIFICATION

Shell Jet A-1 with AL48 is classified for supply purposes as : Flammable (R10), Harmful ( R65: Harmful: may cause lung damage if swallowed), Irritant ( R38: Irritating to skin) and Dangerous for the Environment ( R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment).

Shell Jet A-1 with AL48 is a flammable liquid and can readily explode in the presence of electrostatic charges generated, for example, during pumping or tank cleaning or by other sources of ignition or flame impingement on containers.

Exposure to higher vapour concentrations can lead to nausea, headache, drowsiness and dizziness,

The hydrocarbon composition is similar to white spirit, to which an exposure limit applies. Normal exposures in the open air do not, however, present significant health risks provided care is taken to avoid undue exposure to vapours.

Accidental ingestion can lead to chemical burning of the mouth. Ingestion can lead to vomiting and aspiration into the lungs, which can result in chemical pneumonitis, which can be fatal.

Prolonged and repeated skin contact can lead to detailing of the skin, drying, cracking and dermatitis. Shell

Jet A-1 with AL48 is classified for conveyance purposes as a flammable liquid.

It will not biodegrade in anaerobic conditions and, hence, can be persistent. It contains components which have a high potential to bioaccumulate. It is expected to be slightly toxic to fish.

## 4: FIRST AID MEASURES

### INHALATION

Remove the affected person to fresh air. If breathing has stopped administer artificial respiration. Give cardiac massage if necessary. If the person is breathing, but unconscious, place in the recovery position. Obtain medical assistance immediately.

### SKIN

Flush the contaminated skin with water. Use soap if available. Contaminated clothing should be soaked with water, removed, and laundered before reuse.

### EYES

Flush the eye with copious quantities of water. If irritation persists refer for medical attention.

### INGESTION

DO NOT INDUCE VOMITING. If ingestion is suspected, wash out the mouth with water, and send to hospital immediately. Show this Data Sheet to the physician drawing attention to "Notes for Doctors" in Section 11 below.

## 5: FIRE-FIGHTING MEASURES

| | | |
|---|---|---|
| Extinguishants | - Large Fire : | Foam/Water Fog - NEVER USE WATER JET |
| | - Small Fire : | Foam/Dry Powder/AFFF/CO2/Sand/Earth |

## 6: ACCIDENTAL RELEASE MEASURES

IMMEDIATE EMERGENCY ACTION
Clear people away from the area to a safe place
Do not operate electrical equipment unless flameproof
Summon aid of emergency services if warranted
Treat or refer casualties if necessary

FURTHER ACTION - FIRE
IF SAFE : -
Stop product flow
Use foam, dry powder or carbon dioxide extinguishers
Containers exposed to fire can be cooled by water fog/spray
— NEVER USE WATER JET ""'

FURTHER ACTION - SPILLAGE
IF SAFE : -
Extinguish naked lights, eg cigarettes AVOID MAKING SPARKS
Position fire fighting equipment
Try to stop the flow of liquid product
Prevent product entering waterways, drains etc. (Covering with wet sacking helps)
Use sand, earth or other suitable material

If product reaches waterways, drains etc. inform local and fire authorities
Reclaim product directly or absorb in suitable medium and transfer to suitable, clearly marked containers
See section 13 for disposal of contaminated product and waste

**MARITIME SPILLAGES**

Any spillage of Shell Jet A-1 with AL48 which results in overside pollution must be treated in accordance with the guidleines laid down in the respective Vessel Oil Spill Response Contingency Plan, as required by MARPOL 73/78 Annex 1, Regulation 26. Where the vessel is not required to comply with such legislation, the Owner's and/or Charterer's instructions must be followed. In the absence of any other guidelines, any spillage in territorial/coastal waters must be immediately reported to the appropriate maritime authority, e.g. coast guard, the vessel's local agent if applicable, and the vessel's Owner/Charterer. In international waters, any spillage should be reported to the nearest coastal state, and additional guidance should sought immediately from the vessel's Owner/Charterer.

## 7: HANDLING AND STORAGE

### HANDLING

Shell Jet A-1 with AL48 is intended to be used in closed systems. When it has to be handled, ensure the operation is carried out in a well ventilated area away from sources of ignition. Electrical continuity is required between the transport and storage vessels during product transfer.

### STORAGE

The main considerations relating to the storage of Shell Jet A-1 with AL48 are the suitability of the storage vessel and the avoidance of sources of ignition. Aviation fuels are subject to strict quality requirements in the interests of air safety and product integrity is of paramount importance. Precautions should be taken to avoid water coming into, or remaining, in contact with aviation fuels. The area around storage facilities should be kept clear of combustible material, including vegetation.

## 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### EXPOSURE LIMIT VALUES

The following limits are taken from The Health and Safety Executive's Guidance Note EH40 Occupational Exposure Limits 2002.

UK Occupational Exposure Standards :

None.

### RECOMMENDED PROTECTIVE CLOTHING

Impervious gloves and overalls where regular contact is likely, and goggles if there is a risk of splashing

**9: PHYSICAL AND CHEMICAL PROPERTIES**

| | |
|---|---|
| Physical State : | Mobile liquid at ambient temperature |
| Appearance : | Clear water white/straw |
| Odour: | Characteristic |
| Acidity/Alkalinity : | Not applicable |
| Initial Boiling Point : | 150 Deg. C. |
| Flashpoint : | > 38 Oeg. C. |
| Flammability : | Not applicable |
| Autoflammability : | ca. 220 Deg. C. |
| Flammability Limits - Upper : | 6 % vol. |
| - Lower : Explosive | 1 % vol. |
| Properties : | Not applicable |
| Oxidising Properties : | Not applicable |
| Vapour Pressure @ 20 Deg. C. : | <0.1 k.Pa |
| Relative Density @ 15 Deg. C. : | 0.77 to 0.82 |
| Solubility : Water Solubility : | Very Low |
| Fat solubility/solvent : | Not available |
| Partition Coefficient, n-octanol water : | 3 to >6 for constituents |
| Vapour Density (Air =1) : | >5 |
| Viscosity @ 40 Deg. C. : | 1 to 2 cSt. |

**10: STABILITY AND REACTIVITY**

**CONDITIONS TO AVOID**

Sources of ignition. Extremes of temperature. Store between 0 and 50 Deg. C.

**MATERIALS TO AVOID**

Strong oxidising agents, eg. chlorates which may be used in agriculture.

**DECOMPOSITION PRODUCTS**

The substances arising from the thermal decomposition of these products will largely depend upon the conditions bringing about decomposition. The following substances may be expected from normal combustion :

| | |
|---|---|
| Carbon Dioxide | Polycyclic Aromatic Hydrocarbons |
| Carbon Monoxide | Unburnt Hydrocarbons |
| Water | Unidentified Organic and Inorganic Compounds |
| Particulate Matter | Nitrogen Oxides |

**11: TOXICOLOGICAL INFORMATION**

**ACUTE HEALTH HAZARDS AND ADVICE**

Shell Jet A-1 with AL48 is classified as harmful owing to the aspiration hazard and as a skin irritant.

The main hazards are: in the case of inhalation of higher vapour concentrations, of effects on the central nervous system ; in the case of skin contact of, defatting and irritation ; in the unlikely event of ingestion, of aspiration into the lungs with possible resultant chemically induced pneumonia.

Exposure to higher vapour concentrations can lead to nausea, headache, dizziness, loss of consciousness, and, in oxygen deficient environments, death. A person exposed to significant concentrations of vapour may display drunken behaviour, and his judgement can be impaired.

If the product is accidentally ingested, irritation to the gastric mucous membranes can lead to vomiting. If this occurs, there is a high probability of the product being aspirated into the lungs, which can lead to chemical pneumonitis which can be fatal.

**INHALATION**

Under normal conditions of use Shell Jet A-1 with AL48 is not expected to present an inhalation hazard.

Precautions :

Inhalation of vapours should be avoided. Where, exceptionally, higher concentrations of the vapour may be encountered, e.g. in the event of a spillage in a badly ventilated area, persons should not be allowed to enter the area, even in an emergency, until the atmosphere has been checked and passed as sate for entry by a competent person.

First Aid :

Remove the affected person to fresh air. If breathing has stopped administer artificial respiration. Give cardiac massage if necessary. If the person is breathing, but unconscious, place in the recovery position. Obtain medical assistance immediately.

SKIN

Shell Jet A-1 with AL48 is classified as a skin irritant and has a defatting action on the skin.

**Precautions :**

Avoid contact with the skin by the use of suitable protective clothing.

**First Aid :**

Flush the contaminated skin with water. Use soap if available. Contaminated clothing should be soaked with water, removed, and laundered before reuse.

**EYES**

Shell Jet A-1 with AL48 may cause discomfort to the eye.

**Precautions :**

**If there** is a risk of splashing while handling the liquid, suitable eye protection should be used.

**First Aid :**

Flush the eye with copious quantities of water. If irritation persists refer for medical attention.

INGESTION

Shell Jet A-1 with AL48 is classified as harmful owing to the aspiration hazard. Accidental ingestion can lead to chemical burning of the mouth. Ingestion can lead to vomiting and aspiration into the lungs, which can result in chemical pneumonitis, which can be fatal.

**Precautions :**

Accidental ingestion is unlikely. Normal handling and hygiene precautions should be taken to avoid ingestion.

**First Aid :**

**DO** NOT INDUCE VOMITING Wash out the mouth with water, and, if ingestion is suspected, send to hospital immediately. Show this Data Sheet to the physician drawing attention to "Notes for Doctors" below.

**CHRONIC HEALTH HAZARD AND ADVICE**

Prolonged and repeated contact with Shell Jet A-1 with AL48 can be detrimental to health. The main hazards arise from skin contact and in the inhalation of mists. Skin contact over prolonged periods can lead to defatting of the skin, drying, cracking and possibly dermatitis. Excessive and prolonged inhalation of mists may cause a chronic inflammatory reaction of the lungs and a form of pulmonary fibrosis.

NOTES FOR DOCTORS

HIGH PRESSURE INJECTION INJURIES

High pressure injection injuries require surgical intervention and possibly steroid therapy to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. PROMPT surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetic, and wide exploration is essential.

INGESTION AND ASPIRATION OF PETROLEUM PRODUCTS

There may be a risk to health where low viscosity products are aspirated into the lungs following vomiting, although this is uncommon in adults. Such aspiration would cause intense local irritation and chemical pneumonitis. Children, and those in whom consciousness is impaired, will be more at risk. Emesis of lubricants is not usually necessary, unless a large amount has been ingested, or some other compound has been dissolved in the product. If this is indicated - for example, when there is rapid onset of CNS depression from a large ingested volume - gastric lavage under controlled hospital conditions, with full protection of the airway is required. Supportive care may include oxygen, arterial blood gas monitoring, respiratory support and, if aspiration has occurred, treatment with corticosteroids and antibiotics. Seizures should be controlled with Diazepam, or appropriate equivalent drug.

## 12: ECOLOGICAL INFORMATION

Shell Jet A-1 with AL48 contains kerosine which is classified as dangerous for the environment N R51/53 toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

AIR

Shell Jet A-1 with AL48 is a mixture of non-volatile components, which when released to air will react rapidly with hydroxyl radicals and ozone.

WATER

If released to water, the majority of Shell Jet A-1 with AL48 will evaporate at a moderate rate but a small proportion will dissolve. Dissolved components will be either absorbed in sediments or evaporate to air. In aerobic water and sediments they will biodegrade, but in anaerobic conditions they will persist. Shell Jet A-1 with AL48 is slightly toxic to aquatic organisms and contains components which have a high potential to bioaccumulate, but is unlikely to persist in the aquatic environment for sufficient time to pose significant hazards.

**SOIL**

Small volumes released on land will evaporate at a moderate rate, with a proportion of the product being absorbed in the upper soil layers and being subject to biodegradation. Larger volumes may penetrate into anaerobic soil layers in which the product will persist. The product may reach the water table on which it will form a floating layer, and move along with the groundwater flow. In this case the more soluble components, such as aromatics, will cause groundwater contamination.

## 13: DISPOSAL CONSIDERATIONS

Shell Jet A-1 with AL48 is covered by the Special Waste Regulations. Shell Jet A-1 with AL48 should be disposed of to a licensed waste contractor. Any disposal route should comply with local byelaws and the requirements of the Environmental Protection Act, 1990.

## 14: TRANSPORT INFORMATION

Dangerous for Conveyance

| | |
|---|---|
| UN Number : | 1223 |
| Proper Shipping Name : | Kerosine |
| Symbol : | Flammable Liquid |
| Packing Group : | III |
| Marine Pollutant : | No |
| IATA/ICAO Hazard Class : | 3 |
| IMO Hazard Class : | 3.3 |
| Class : | 3 |
| Classification Code : | F1 |
| Hazard Identification No. : | 30 |
| Hazchem Code : | 31YI |

## 15: REGULATORY INFORMATION

This material has been classified according to the requirements of the Chemicals ( Hazard Information and Packaging for Supply) Regulations.

Dangerous for Supply

| | |
|---|---|
| Symbols : | St. Andrew's Cross<br>Dead Fish and Tree |
| Categories of danger : | Flammable<br>Harmful<br>Irritant<br>Dangerous for the Environment |
| Risk Phrases : | RIO Flammable<br>R65 Harmful: may cause lung damage if swallowed<br>R38 Irritating to skin<br>R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment |
| Safety Phrases : | S2 Keep out of the reach of children<br>S23 Do not breathe vapour<br>S24 Avoid contact with skin<br>S29 Do not empty into drains<br>S43 In case of fire use foam/dry powder/AFFF/CO2 - NEVER USE WATER<br>S61 Avoid release to the environment. Refer to special instructions / safety data sheets<br>S62 If swallowed, do not induce vomiting : seek medical advice immediately and show this container or label |
| Contains : | Kerosine unspecified |
| Other Information : | Safety data sheet available for professional user on request. |

## 16: OTHER INFORMATION

The references set out below give further information on specific aspects.

**LEGISLATION**

Consumer Protection Act 1987
Control of Pollution Act 1974
Environmental Protection Act 1990
Factories Act 1961
Health and Safety at Work Act 1974

Carnage of Dangerous Goods by Road *and* Rail (Classification, Packaging and Labelling) Regulations
Chemical (Hazards, Information, and Packaging for Supply) Regulations
Control of Substances Hazardous to Health Regulations
Dangerous Substances in Harbour Areas Regulations
Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations
Road Traffic (Carriage of Dangerous Substances in Packages etc.) Regulations
Road Traffic (Carriage of Dangerous Substances in Road Tankers and Tank Containers) Regulations
Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
Special Waste Regulations

**GUIDANCE NOTES**

| | |
|---|---|
| CS/15 | The cleaning and gas freeing of tanks containing flammable residues |
| HS(G)22 | Electrical apparatus for use in potentially explosive atmospheres |
| HS(G)51 | The storage of flammable liquids in containers |
| HS(G)140 | The safe use and handling of flammable liquids |
| HS(G)176 | Storing flammable liquids in tanks |
| HS(G)71 | The storage of packaged dangerous substances |
| EH/40 | Occupational Exposure Limits |
| EH/58 | The Carcinogenicity of Mineral Oils |
| MS24 | Health surveillance of occupational skin disease |

**BRITISH STANDARDS**

| | |
|---|---|
| BS 799 | Specification for Oil Burning Equipment |
| BS 2000 | Methods of Test for Petroleum and its Products |
| BS 2869 | Fuel Oils for Oil Engines and Burners for Non-Marine Use |
| BS 5345 | Selection, Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres |
| BS 5410 | Oil Firing |
| BS 5958 | Control of Undesirable Static Electricity |

**OTHER LITERATURE**

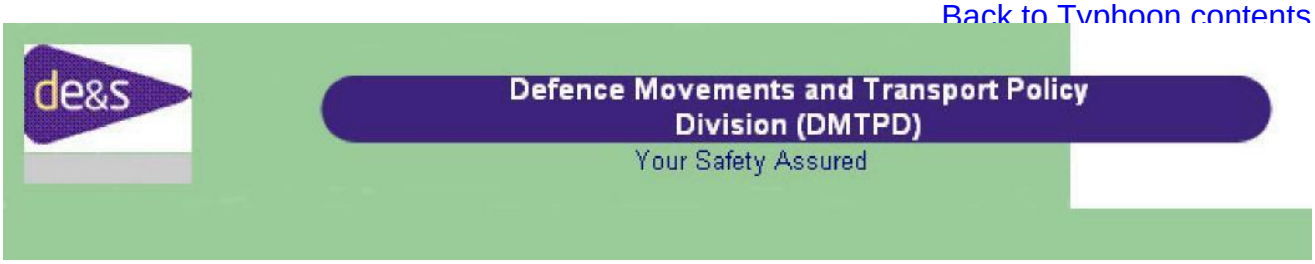
Concawe Report 01/97 Petroleum Products - First Aid Emergency and Medical Advice

Department of the Environment - Waste Management • The Duty of Care • A Code of Practice

European Model Code of Safe Practice in the Storage and Handling of Petroleum Products
Institute of Petroleum Marketing Safety Code
Department of Trade - Code of Portable Tanks and Road Tank Vehicles for the Carriage of Liquid Dangerous Goods in Ships

**ADDRESSES**

Concawe, Boulevard du Souverain 165 B - 1160 Brussels, Belgium
Institute of Petroleum, 61 New Cavendish Street, London W1




**HSIS Safety Data Sheet**

| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 9150999100572 | 9150 | 99 | 9100572 |

| Supply Description | |
|---|---|
| **SDS Version** | 1 |
| **Item Name** | OM 15 |
| **Kit Reference** | |
| **Other Description** | Gas Oil |
| **Commercial Name/Product No*** | Aero HF 585B |
| **Additional Product ID** | |
| **SDS Date** | 13 March 2009 |
| **Manufacturers SDS Reference** | 3 Oct 2008 |
| **Supplier** | Castrol - UK - Ltd |
| **Address** | Wakefield House Pipers Way Swindon |
| **Post Code** | SN3 1RE |
| **Suppliers Business Telephone Number** | . |
| **Emergency Tel No** | |
| **IPT** | |
| **Army** | NK |
| **Navy** | NK |
| **RAF** | NK |
| **REACH Reference Number** | |
| **NCage** | |
| **Status Comment** | |

| Other Information | |
|---|---|
| **Other Information** | |
| **Chemical Content** | No Chemical Content for this SDS |
| **Related SDS** | |

## 1 . Identification of the substance/preparation and company/undertaking

| | |
|---|---|
| **Product name** | **Aero HF 585 B** |
| **SDS no.** | 450458 |
| **Historic SDS no.** | UK-1973, NL-450458, DE-18964, FR-450458, BE-450458, PL-AER58B, AT-450458, NO-450458, FI-450458, SE-450458 |
| **Use of the substance/preparation** | Hydraulic fluid<br>For specific application advice see appropriate Technical Data Sheet or consult our company representative. |
| **Supplier** | Castrol (U.K.) Limited<br>Wakefield House<br>Pipers Way<br>Swindon<br>Wiltshire, SN3 1RE<br>United Kingdom<br>Tel.: +44 (0)1793 512712<br>Fax.: +44 (0)1793 486083 |
| **EMERGENCY TELEPHONE NUMBER** | Carechem: +44 (0) 208 762 8322 |
| **E-mail address** | MSDSadvice@bp.com |

## 2 . Hazards identification

This preparation is classified as dangerous according to Directive 1999/45/EC as amended and adapted.

| | |
|---|---|
| **Human health hazards** | Repeated exposure may cause skin dryness or cracking. |
| **Environmental hazards** | May cause long-term adverse effects in the aquatic environment. |
| **Additional hazards** | Note: High Pressure Applications<br>Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency.<br>See 'Notes to physician' under First-Aid Measures, Section 4 of this Safety Data Sheet. |

See sections 11 and 12 for more detailed information on health effects and symptoms and environmental hazards.

## 3 . Composition/information on ingredients

Highly refined mineral oil and additives.

| Chemical name | CAS no. | | EINECS / ELINCS. | Classification | |
|---|---|---|---|---|---|
| Gas oil - unspecified | 64742-46-7 | 50 - 100 | 265-148-2 | Xn; R65<br>R66<br>R53 | [1] |
| Triphenyl phosphate | 115-86-6 | 0.1 - 1 | 204-112-2 | N; R50153 | [1] |

See section 16 for the full text of the R-phrases declared above

[1] Substance classified with a health or environmental hazard

[2] Substance with a workplace exposure limit

[3] PBT-substance

[4] vPvB-substance

Occupational exposure limits, if available, are listed in section 8.

## 4 . First-aid measures

| | |
|---|---|
| **Eye contact** | In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs. |
| **Skin contact** | Immediately wash exposed skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if irritation develops. |
| **Inhalation** | If inhaled, remove to fresh air. Get medical attention if symptoms appear. |
| **Ingestion** | Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately. |

| | |
|---|---|
| **Notes to physician** | Treatment should in general be symptomatic and directed to relieving any effects.<br>Note: High Pressure Applications<br>Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency. Injuries may not appear serious at first but within a few hours tissue becomes swollen, discoloured and extremely painful with extensive subcutaneous necrosis.<br>Surgical exploration should be undertaken without delay. Thorough and extensive debridement of the wound and underlying tissue is necessary to minimise tissue loss and prevent or limit permanent damage.<br>Note that high pressure may force the product considerable distances along tissue planes. |

## 5 . Fire-fighting measures

**Extinguishing media**

| | |
|---|---|
| **Suitable** | In case of fire, use water fog, foam, dry chemical or carbon dioxide extinguisher or spray. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain. |
| **Not suitable** | Do not use water jet. |
| **Hazardous decomposition products** | Decomposition products may include the following materials:<br>carbon dioxide<br>carbon monoxide |
| **Unusual fire/explosion hazards** | This material is not explosive as defined by established regulatory criteria. |
| **Special fire-fighting procedures** | None identified. |
| **Protection of fire-fighters** | Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear. |

## 6 . Accidental release measures

| | |
|---|---|
| **Personal precautions** | No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8). |
| **Environmental precautions** | Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. |
| **Large spill** | Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.<br>Note: see section 1 for emergency contact information and section 13 for waste disposal. |
| **Small spill** | Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor. |

## 7 . Handling and storage

| | |
|---|---|
| **Handling** | Avoid contact with skin and clothing. Avoid prolonged or repeated contact with skin. Avoid contact of spilt material and runoff with soil and surface waterways. Wash thoroughly after handling. |
| **Storage** | Keep container tightly closed. Keep container in a cool, well-ventilated area. |

## 8 . Exposure controls/personal protection

| **Ingredient name** | **Occupational exposure limits** |
|---|---|
| **Gas oil -** unspecified | **EH40-0ES (United Kingdom (UK)).**<br>STEL: 10 mg/m$^3$ 15 minute(s). Form: Oil mist, mineral<br>TWA: 5 mg/m$^3$ 8 hour(s). Form: Oil mist, mineral |
| Base oil - unspecified | **EH40-0ES (United Kingdom (UK)).**<br>STEL: 10 mg/m$^3$ 15 minute(s). Form: Oil mist, mineral<br>TWA: 5 mg/m$^3$ 8 hour(s). Form: Oil mist, mineral |
| Triphenyl phosphate | **EH40/2005 WELs (United Kingdom (UK)).**<br>STEL: 6 mg/m$^3$ 15 minute(s). Issued/Revised: 1/1997<br>TWA: 3 mg/m$^3$ 8 hour(s). Issued/Revised: 1/1997 |

**ACGIH TLVs**

| | |
|---|---|
| **Gas** oil - unspecified | **ACGIH (United States).**<br>STEL: 10 mg/m$^3$ 15 minute(s). Form: Oil mist, mineral<br>TWA: 5 mg/m$^3$ 8 hour(s). Form: Oil mist, mineral |
| Base oil - unspecified | **ACGIH (United States).**<br>STEL: 10 mg/m$^3$ 15 minute(s). Form: Mineral oil, mist<br>TWA: 5 mg/m$^3$ 8 hour(s). Form: Mineral oil, mist |

For information and guidance, the ACGIH values are included. For further information on these please consult your supplier.

Whilst specific OELs for certain components may be shown in this section, other components may be present in any mist, vapour or dust produced. Therefore, the specific OELs may not be applicable to the product as a whole and are provided for guidance only.

**Exposure controls**

| | |
|---|---|
| **Occupational exposure controls** | Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits. |

| | |
|---|---|
| **Hygiene measures** | Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. |
| **Personal protective equipment** | |
| **Respiratory protection Hand** | None required. However, use of adequate ventilation is good industrial practice. |
| **protection** | Wear protective gloves if prolonged or repeated contact is likely.<br>Chemical-resistant gloves. Recommended: nitrile gloves<br>The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. |
| **Eye protection** | Safety glasses with side shields. |
| **Skin and body** | Avoid contact with skin. Wear suitable protective clothing. |

## 9 . Physical and chemical properties

**General information**

**Appearance**

| | |
|---|---|
| **Physical state** | Liquid. |
| **Colour** | Red. |
| **Odour** | Mild |

**Important health, safety and environmental information**

| | |
|---|---|
| **Flash point** | Closed cup: >81°C (>177.8°F) [Pensky-Martens.] |
| **Viscosity** | Kinematic: 13.5 $mm^2/s$ (13.5 cSt) at 40°C |
| **Boiling point / range** | >200°C (>392°F) |
| **Pour point** | 60 ℃ |
| **Density** | <1000 kg/m' (<1 $g/cm^3$) at 20°C |
| **Solubility** | insoluble in water. |

## 10 . Stability and reactivity

| | |
|---|---|
| **Stability** | The product is stable. |
| **Possibility of hazardous reactions** | Under normal conditions of storage and use, hazardous reactions will not occur. |
| **Conditions to avoid** | High temperatures |
| **Materials to avoid** | Reactive or incompatible with the following materials: oxidizing materials. |
| **Hazardous decomposition products** | Combustion products may include the following:<br>carbon oxides |
| | Under normal conditions of storage and use, hazardous decomposition products should not be produced. |

## 11 . Toxicological information

**Chronic toxicity**

| | |
|---|---|
| **Chronic effects** | Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis. |

**Effects and symptoms**

| | |
|---|---|
| **Eyes** | May cause mild eye irritation. |
| **Skin** | Slightly irritating to the skin. Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. |
| **Inhalation** | Inhalation of oil mist or vapours at elevated temperatures may cause respiratory irritation. |
| **Ingestion** | Ingestion may cause gastrointestinal irritation and diarrhoea. |

## 12 . Ecological information

| | |
|---|---|
| **Persistence/degradability** | Inherently biodegradable |
| **Mobility** | Non-volatile. Liquid. insoluble in water. |
| **Environmental hazards** | May cause long-term adverse effects in the aquatic environment. |

## 13 . Disposal considerations

| | |
|---|---|
| **Disposal considerations / Waste information** | The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. |
| **Unused product** | |

| | |
|---|---|
| **European waste catalogue (EWC)** | 13 01 10* mineral based non-chlorinated hydraulic oils |
| | However, deviation from the intended use and/or the presence of any potential contaminants may require an alternative waste disposal code to be assigned by the end user. |

**Packaging**

| | |
|---|---|
| **European waste catalogue (EWC)** | 15 01 10* packaging containing residues of or contaminated by dangerous substances |

## 14 . Transport information

Not classified as hazardous for transport (ADR/RID, ADNR, IMDG, ICAO/IATA)

## 15 . Regulatory information

Classification and labelling have been performed according to EU directives 1999/45/EC and 67/548/EEC as amended and adapted. **Label requirements**

| | |
|---|---|
| **Risk phrases** | R66- Repeated exposure may cause skin dryness or cracking.<br>R53- May cause long-term adverse effects in the aquatic environment. |
| **Safety phrases** | S24- Avoid contact with skin.<br>S61- Avoid release to the environment. Refer to special instructions/safety data sheet. |

**Other regulations**

| | |
|---|---|
| **Europe inventory** | All components are listed or exempted. |
| **United States inventory (TSCA 8b)** | All components are listed or exempted. |
| **Australia inventory (AICS)** | All components are listed or exempted. |
| **Canada inventory** | All components are listed or exempted. |
| **China inventory (IECSC)** | All components are listed or exempted. |
| **Japan inventory (ENCS)** | All components are listed or exempted. |
| **Korea inventory (KECI)** | All components are listed or exempted. |
| **Philippines inventory (PICCS)** | At least one component is not listed. |

## 16 . Other information

| | |
|---|---|
| **Full text of R-phrases referred to in sections 2 and 3** | R65- Harmful: may cause lung damage if swallowed.<br>R66- Repeated exposure may cause skin dryness or cracking.<br>R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.<br>R53- May cause long-term adverse effects in the aquatic environment. |

**History**

| | |
|---|---|
| Date of issue/ Date of revision | 03/10/2008. |
| Date of previous issue | 20/02/2008. |
| **Prepared by** | Product Stewardship Group |

Notice to reader

Vindicates information that has changed from previously issued version.

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from us.

It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken.

Defence Movements and Transport Policy Division (DMTPD)

Your Safety Assured

| HSIS Safety Data Sheet | | | |
|---|---|---|---|
| **NSN** | **NSC** | **Country Code*** | **NIIN*** |
| 9150992201940 | 9150 | 99 | 2201940 |

| Supply Description | |
|---|---|
| **SDS Version** | 4 |
| **Item Name** | Lubricating Oil Aircraft Turbine Engine Synthetic |
| **Kit Reference** | |
| **Other Description** | OX-27 |
| **Commercial Name/Product No*** | Turbonycoil 600 |
| **Additional Product ID** | TN600-1 |
| **SDS Date** | 17 November 2009 |
| **Manufacturers SDS Reference** | Version 3 dated 26-03-2009 |
| **Supplier** | NYCO S A |
| **Address** | 49 Rue de Ponthieu 75008 Paris |
| **Post Code** | |
| **Suppliers Business Telephone Number** | 33-0-145615000 |
| **Emergency Tel No** | 33-0-145 42 59 59 |
| **IPT** | |
| **Army** | NK |
| **Navy** | NK |
| **RAF** | 34B |
| **REACH Reference Number** | |
| **NCage** | |
| **Status Comment** | |

| Other Information | |
|---|---|
| **Other Information** | |
| **Chemical Content** | No chemical content for this SDS |
| **Related SDS** | |

# SAFETY DATA SHEET

## 1 - IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Identification of the substance or preparation:

Name: TURBONYCOIL 600
Product code: TN600-1

Company/undertaking identification:

Registered company name: NYCO S.A..
Address: 49, rue de Ponthieu.75008.PARIS.France.
Telephone: +33 (0)1 45 61 50 00. Fax:+33 (0)1 45 61 50 13. Telex:.
info@nyco.fr
www.nyco.fr

Emergency telephone: +33 (0)1 45 42 59 59.
Association/Organisation: INRS ORFILA www.oentres-anti-poison.net.

Use of the substance/preparation:

Synthetic lubricating oil for aircraft turbines

## 2 – HAZARDS IDENTIFICATION

This product is not classed as flammable. Refer to the recommendations regarding the other products present on the site
This preparation is not classed as hazardous to health by directive 1999/45/EC.
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Other data:**

This product is not expected to produce adverse health effects under normal conditions of use and with appropriate personal hygiene practices.
Product may decompose at elevated temperatures or under fire conditions and produce harmful gases or vapours. Vapours or mist of heated product may be harmful by inhalation.
The product shall be used only for its intended use described in section 1. For any other use, please contact the manufacturer.

## 3 – COMPOSITION/INFORMATION ON INGREDIENTS

Full text of risk phrases appearing in section 3: see section 16.

Hazardous substances present on their own:

(present in the preparation at **a** sufficient concentration to give it the toxicological characteristics it would have in a 100% pure state)
This preparation contains no hazardous substance in this category.

**Other** substances **representing a hazard:**

| **INDEX** | CAS | **EC** | Name | **Syrnb.** | **R:** | |
|---|---|---|---|---|---|---|
| 115_86 6 | 115-86-6 | **204-112-2** | **TRIPH ENYL** PHOSPHATE | N | **5W53** | **x % < 2.5** |
| **68411 46** 1 | 68411-46-1 | **270-128-1** | BENZENAMINE, N-PHENYL-, REACTION PRODUCTS WITH 2.4,4-TRIMETHYLPENTENE | N | **51/53** | 0**<= x % < 2.5** |

**Substances present at a concentration** below the minimum danger threshold:

| **INDEX** | **CAS** | **EC** | Name | **Syrnb.** | **R:** | |
|---|---|---|---|---|---|---|
| **68937_41_7** | **68937-41-7** | **273-066-3** | PHENOL, **ISOPROPYLATED, PHOSPHATE (3:1** | **Xn** | **62.F3 63.G3** | **x % < 2.5** |

**Other substances with occupational exposure** limits:
No known substance in this category present.

## 4 - FIRST AID MEASURES

As a general rule, in case of doubt or if symptoms persist, always call a doctor.

NEVER induce swallowing in an unconscious person.

In the event of exposure by inhalation:

Remove immediately from exposure. Avoid exposure of other personnel. Use adequate respiratory protection and seek medical assistance if dizziness, nausea or respiratory irritation occurs.

In the event of splashes or contact with eyes:

Rinse at once with water, carry on during at least 15 minutes. also under the eyelids. If eye irritation persists, consult a specialist

In the event of splashes or contact with skin:

Take off at once the soiled clothes. Wash with soap and water. Seek medical advice if a problem persists

In the event of swallowing:

Seek immediate medical assistance. Rinse the mouth with water.

## 5 - FIRE-FIGHTING MEASURES

Not relevant.

Suitable extinguishing media:

Carbon dioxide ($CO_2$) - Foam - Dry chemicals

Special protective **equipment for fire-fighters:**

Fire-fighters must use self-contained breathing apparatus. Product may generate irritating and harmful gases/vapours/fumes when heated and burning, including aldehydes, carbon monoxide. pyrolyzed organic phosphates and phosphorus oxides.

## 6- ACCIDENTAL RELEASE MEASURES

Personal precautions:

Consult the safety measures listed under headings 7 and 8.

Environmental precautions:

Contain and control the leaks or spills with non-combustible absorbent materials such as sand, earth, vermiculite. diatomaceous earth in drums for waste disposal.

Prevent any material from entering drains or waterways.

Use drums to dispose of waste recovered in accordance with applicable regulations (see heading 13).

If the product contaminates waterways, rivers or drains, alert the relevant authorities in accordance with statutory procedures

**Methods for cleaning up:**

Clean preferably with a detergent, do not use solvents.

## 7 - **HANDLING** AND STORAGE

The regulations relating to storage premises apply to workshops where the product is handled.

Handling:

Handle in well ventilated areas.

Fire prevention:

Prevent access by unauthorised personnel.

Recommended equipment and procedures:

For personal safety, see §8.

Observe precautions stated on label and also industrial safety regulations

**Prohibited equipment and procedures:**

Smoking. eating and drinking are prohibited in premises where the preparation is used

Never open the packages under pressure

**Storage:**

**Keep the** container tightly closed in a dry place.

Ground of buildings must be impervious and build an hoding back basin to avoid liquid leakage outside in case of accidental overflow

## 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Use personal protection equipment as per Directive 89/686/EEC. **Exposure limit values per INRS ED 984:**

| France | VME-ppm: | VME-mg/m3: | VLE-ppm: | VLE-mg/m3: | Notes: | TMP N°: |
|---|---|---|---|---|---|---|
| 1**15-80-C** | | 3 | | | | |

**Exposure** limit values **(2003-2006):**

| UK/WELs | TWA: | STEL: | Ceiling: | Definition: | Criterion: |
|---|---|---|---|---|---|
| 115-86-6 | 3mg/m3 | 6 mg/m3 | - | - | - |
| UKIOES | TWA | STEL: | Ceiling: | Definition: | Criterion: |
| 115-86-6 | 3mg/m3 | 6 mg/m3 | - | - | - |
| ACGIH/TLV | TWA | STEL: | Ceiling: | Definition: | Criterion: |
| 115-86-6 | 3mg/m3 | - | | - | - |

**Respiratory protection:**

**No protection** is required under normal conditions of use and with adequate ventilation. Wear an approved respirator in the presence of aerosols and when in contact with the heated product vapours.

**Hand protection:**

Type of gloves recommended :

When using gloves they must be in nitrile rubber (HNBR)

Eye and face protection:

In the event of splashing wear security goggles

Skin protection:

For further information, see § 11 of S.D.S. - Toxicological information.

## 9 - PHYSICAL AND CHEMICAL PROPERTIES

**General information:**

**Physical state:** **fluid liquid**

**Important health, safety and environmental information:**

**pH of the substance or preparation:** **not relevant**

**The pH is impossible to measure or its value is not relevant.**

| | |
|---|---|
| **Boiling point/boiling range:** | **not relevant** |
| **Flash point interval:** | **Flash point > 60°C** |
| **Flash point:** | **271.00 C.** |
| **Vapour pressure:** | **Below 110 kPa (1.10 bar).** |
| **Density:** | **< 1** |
| **Density:** | **0.993 kg/drn3 @ 20°C** |
| **Water solubility:** | **Insoluble.** |
| **Viscosity:** | **5 mm./s c 100°C** |

**Other information:**

| | |
|---|---|
| **melting point/melting range:** | **-57 °C.** |
| **Self-ignition temperature:** | **not relevant** |
| **Decomposition poinUdecomposition range :** | **not relevant** |

## 10 - STABILITY AND REACTIVITY

**The preparation is stable at the handling** and storage conditions recommended per § 7 of the safety data sheet.

**Conditions to avoid:**

**Caoutchouc nature!, polyacrylate. polybutadiene** et assimiles.

**Hazardous decomposition products:**

**Mono and Di oxides of carbon. Phosphorus oxides**

## 11 - TOXICOLOGICAL INFORMATION

No data is available regarding the preparation itself.

## 12 - **ECOLOGICAL INFORMATION**

No ecological data on the product itself is available.

**The product** must not be allowed to run into drains or waterways.

**Ecotoxicity:**

**Harmful to aquatic organisms, may** cause long-term adverse effects in the aquatic environment.

## 13 - **DISPOSAL CONSIDERATIONS**

Do not pour into drains or waterways.

Waste:

Recycle or dispose of waste in compliance with current legislation, preferably via a certified collector or company.

Do not contaminate the ground or water with waste, do not dispose of waste into the environment.

Soiled packaging:

Empty container completely. Keep label(s) on container.

Give to a certified disposal contractor.

**Codes of wastes (Decision 2001/573/EC, Directive 2006112/EEC, Directive 94131/EEC on hazardous waste) :**

13 02 06

## 14 - TRANSPORT INFORMATION

**Exempt** from transport classification and labelling.

Transport product in compliance with provisions of the ADR for road, RID for rail, IMDG for sea and ICAO/IATA for air transport IADR 2007 - IMDG 2006 - ICAO/IATA 2007).

## 15 - REGULATORY INFORMATION

This preparation was classified in compliance with the directive known as <All preparations> 1999/45/EC and its adaptations

In addition directive 2008/58/EC with the 30° adaptation of directive 67/548/EEC (Hazardous substances) have been taken into account.

This preparation is not classed as hazardous to health by directive 1999/45/EC.

This product is not classed as flammable.

**Particular hazards associated with the preparation and safety recommendations:**

| | |
|---|---|
| **R 52/53** | **I Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment** |
| **S 61** | **Avoid release to the environment. Refer to special instructions/Safety data sheets.** |

## 16 – OTHER INFORMATION

Since the user's working conditions are not known by us, the information supplied on this safety **data sheet is based on our** current level of knowledge and on national and community regulations.

The product must not be used for any purposes other than those specified under heading 1 without first obtaining written handling instructions.

It is at all times the responsibility of the user to take all necessary measures to comply with legal requirements and local regulations.

The information given on this safety data sheet must be regarded as a description of the safety requirements relating to our product and not a guarantee of its properties

**Full text of risk phrases appearing in section 3:**

| | |
|---|---|
| **R 5W53** | **Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.** |
| **R 51/53** | **Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.** |
| **R 62.F3** | **Possible risk of impaired fertility.** |
| **R 63.G3** | **Possible risk of harm to the unborn child.** |

**Defence Movements and Transport Policy Division (DMTPD)**

Your Safety Assured

## HSIS Safety Data Sheet

| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 150992807286 | 9150 | 9 | 2807286 |

| | Supply Description | |
|---|---|---|
| **SDS Version** | **1** | |
| **Item Name** | Lubricating Oil General Purpose | |
| **Kit Reference** | | |
| **Other Description** | Synthetic hydrocarbon coolant for aircraft electronics | |
| **Commercial Name/Product No*** | AeroShell Fluid 602 | |
| **Additional Product ID** | 001A0909 | |
| **SDS Date** | 02 July 2009 | |
| **Manufacturers SDS Reference** | Version 1 Dated 09-03-2007 | |
| **Supplier** | SIL-MID Ltd | |
| **Address** | 2 Roman Park Birmingham | |
| **Post Code** | B46 1H | |
| **Suppliers Business Telephone Number** | 0151 350 4000 | |
| **Emergency Tel No** | 0151 350 4595 | |
| **IPT** | | |
| **Army** | NK | |
| **Navy** | NK | |
| **RAF** | 34B | |
| **REACH Reference Number** | | |
| **NCage** | U5F65 | |
| **Status Comment** | | |

| Other Information | | |
|---|---|---|
| **Other Information** | 5 Gallon Steel Can | |
| **Chemical Content** | Low viscosity polyalphaolefin 95 – 100% | |
| **Related SDS** | | |

**Material Safety Data Sheet** according to EC directive 2001/58/EC

## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

**Material Name** **AeroShell Fluid 602**
**Uses** Synthetic hydrocarbon coolant fluid for aircraft electronics. For further details consult the AeroShell Book on www.shell.com/aviation.
**Product Code** 001A0909

**Manufacturer/Supplier** **: Shell UK Oil Products Limited**
**PO** Box 3
Ellesmere Port
CH65 4HB
United Kingdom

**Telephone** +44-(0) 151-350-4000
**Fax** +44-(0) 151-350-4843

**Emergency Telephone Number** **:** +44-(0) 151-350-4595

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

**Preparation description** **:** Blend of polyolefins and additives.

**Hazardous Components**

| Chemical Name | CAS | EINECS | Symbol(s) | R-phrase(s) | Conc. |
|---|---|---|---|---|---|
| Low viscosity polyalphaolefin | 68649-11-6 | 500-228-5 | Xn | R65 | 95.00 - 100.00 % |
| 4,4'-methylene-bis-(2,6-di-tert-butylphenol) | 118-82-1 | 204-279-1 | | R53 | 1.00 - 3.00 % |

**Additional Information** **:** Refer to chapter 16 for full text of EC R-phrases.

## 3. HAZARDS IDENTIFICATION

**EC Classification** : Harmful.

**Health Hazards** Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Harmful: may cause lung damage if swallowed. Used oil may contain harmful impurities.

**Signs and Symptoms** If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

**Safety Hazards** : Not classified as flammable but will burn.
**Environmental Hazards** : Not classified as dangerous for the environment.

## 4. FIRST AID MEASURES

**Inhalation** No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

**Skin Contact** Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

**Eye Contact** Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

**Ingestion** If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (37° C), shortness of breath, chest congestion or continued coughing or wheezing.

**Advice to Physician** : Treat symptomatically. Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal. Call a doctor or poison control center for guidance.

## 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

**Specific Hazards** : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

**Extinguishing Media** : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

**Unsuitable Extinguishing Media** : Do not use water in a jet.

**Protective Equipment for Firefighters** : Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

## 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

**Protective measures** : Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

**Clean Up Methods** : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay,

sand or other suitable material and dispose of properly.

**Additional Advice** : Local authorities should be advised if significant spillages cannot be contained.

## 7. HANDLING AND STORAGE

**General Precautions** : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

**Handling** : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

**Storage** : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: -50 - 50°C / -58 - 122°F
The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance maybe obtained from the local environmental agency office.

**Recommended Materials** :For containers or container linings, use mild steel or high density polyethylene.

**Unsuitable Materials** :PVC.

**Additional Information** :Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion. Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication "COSHH Essentials".

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Limits**

**Exposure Controls** **:** The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

**Personal Protective Equipment** **:** Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

**Respiratory Protection :** No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the

| | | |
|---|---|---|
| | | specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN141. |
| **Hand Protection** | : | Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. |
| **Eye Protection** | : | Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166. |
| **Protective Clothing** | : | Skin protection not ordinarily required beyond standard issue work clothes. |
| **Monitoring Methods** | : | Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. |
| **Environmental Exposure Controls** | : | Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance | Clear colourless. Liquid at room temperature. |
| Odour | Slight hydrocarbon |
| pH | Not applicable. |
| Boiling point | > 280 °C / 536 °F estimated value(s) |
| Pour point | < -73 °C / -99 °F |
| Flash point | Typical 160 °C / 320 °F (COC) |
| Explosion / Flammability limits in air | Typical 1 - 10 %(V) (based on mineral oil) |
| Auto-ignition temperature | > 320 °C / 608 °F |
| Vapour pressure | < 0.5 Pa at 20 °C / 68 °F (estimated value(s)) |
| Density | Typical 800 kg/m3 at 15 °C / 59 °F |
| Water solubility | Negligible. |
| n-octanol/water partition coefficient (log Pow) | > 6 (based on information on similar products) |
| Kinematic viscosity | Typical 5.1 mm2/s at 40 °C / 104 °F |
| Vapour density (air=1) | > 1 (estimated value(s)) |
| Evaporation rate (nBuAc=1) | Data not available |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| **Stability** | Stable. |
| **Conditions to Avoid** | Extremes of temperature and direct sunlight. |
| **Materials to Avoid** | Strong oxidising agents. |
| **Hazardous Decomposition Products** | Hazardous decomposition products are not expected to form during normal storage. |

## 11. TOXICOLOGICAL INFORMATION

| | |
|---|---|
| **Basis for Assessment** | : Information given is based on data on the components and the toxicology of similar products. |
| **Acute Oral Toxicity** | : Expected to be of low toxicity: LD50 >2000 mg/kg , Rat Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal. |
| **Acute Dermal Toxicity** | Expected to be of low toxicity: LD50 >2000 mg/kg , Rabbit |
| **Acute Inhalation Toxicity** | This product is not expected to pose an inhalation hazard under conditions of foreseeable use. |
| **Skin Irritation** | : Expected to be slightly irritating. Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis. |
| **Eye Irritation** | : Expected to be slightly irritating. |
| **Respiratory Irritation** | Inhalation of vapours or mists may cause irritation. |
| **Sensitisation Repeated** | : Not expected to be a skin sensitiser. |
| **Dose Toxicity** | : Not expected to be a hazard. |
| **Mutagenicity** | : Not considered a mutagenic hazard. |
| **Carcinogenicity** | : Components are not known to be associated with carcinogenic effects. |
| **Reproductive and Developmental Toxicity** | : Not expected to be a hazard. |
| **Additional Information** | : Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. |

## 12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

| | |
|---|---|
| **Acute Toxicity** | : Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). |
| **Mobility** | : Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile. |
| **Persistence/degradability** | : Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment. |
| **Bioaccumulation** | : Contains components with the potential to bioaccumulate. |

**Other Adverse Effects** : Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

## 13. DISPOSAL CONSIDERATIONS

**Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.

**Container Disposal** Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

**Local Legislation** Disposal should be in accordance with applicable regional, national, and local laws and regulations.
EU Waste Disposal Code (EWC): 13 02 06 synthetic engine, gear and lubricating oils. Classification of waste is always the responsibility of the end user.
Hazardous Waste (England and Wales) Regulations 2005.

## 14. TRANSPORT INFORMATION

**ADR**
This material is not classified as dangerous under ADR regulations.

**RID**
This material is not classified as dangerous under RID regulations.

**ADNR**
This material is not classified as dangerous under ADNR regulations.

**IMDG**
This material is not classified as dangerous under IMDG regulations.

**IATA (Country variations may apply)**
This material is not classified as dangerous under IATA regulations.

## 15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

| | | |
|---|---|---|
| EC Classification | : | Harmful. |
| EC Symbols | : | Xn Harmful. |
| EC Risk Phrases | : | R65 Harmful: may cause lung damage if swallowed. |
| EC Safety Phrases | : | S62 If swallowed, do not induce vomiting: seek medical advice |

| | |
|---|---|
| | immediately and show this container or label. |
| EINECS | All components listed or polymer exempt. |
| TSCA | All components listed. |
| Classification triggering components | Contains low viscosity polyalphaolefins. |

Other Information : Environmental Protection Act 1990 (as amended). Health and Safety at Work Act 1974. Consumers Protection Act 1987. Control of Pollution Act 1974. Environmental Act 1995. Factories Act 1961. Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. Control of Substances Hazardous to Health Regulations 1994 (as amended). Road Traffic (Carriage of Dangerous Substances in Packages) Regulations. Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations. Road Traffic (Carriage of Dangerous Substances in Road Tankers in Tank Containers) Regulations. Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. Health and Safety (First Aid) Regulations 1981. Personal Protective Equipment (EC Directive) Regulations 1992. Personal Protective Equipment at Work Regulations 1992.

## 16. OTHER INFORMATION

R-phrase(s)

| | |
|---|---|
| R53 | May cause long-term adverse effects in the aquatic environment. |
| R65 | Harmful: may cause lung damage if swallowed. |

| | |
|---|---|
| **MSDS Version Number** | : 1. |
| **MSDS Effective Date** | 09.03.2007 |
| **MSDS Revisions** | A vertical bar (I) in the left margin indicates an amendment from the previous version. |
| **MSDS Regulation** | The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC. |
| **Uses and Restrictions** | Not to be used as an engine lubricating oil.<br>Contains a synthetic oil and should not be used in contact with incompatible seal materials.<br>This product must be used, handled and applied in accordance with the requirements of the equipment manufacturer's manuals, bulletins and other documentation. |
| **MSDS Distribution** | : The information in this document should be made available to |

| | |
|---|---|
| | **all who may handle the product.** |
| **Disclaimer** | **: This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.** |

| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 6140123679690 | 6140 | 12 | 3679690 |
| **Supply Description** | | | |
| **SDS Version** | 2 | | |
| **Item Name** | Battery assembly | | |
| **Kit Reference** | | | |
| **Other Description** | Manufacturers part no 3128985 | | |
| **Commercial Name/Product No*** | Typhoon Battery | | |
| **Additional Product ID** | | | |
| **SDS Date** | | | |
| **Manufacturers SDS Reference** | Issue 4 Dated November 2012 | | |
| **Supplier** | Hawker GmbH | | |
| **Address** | PO Box 4280 D-58042 Hagen Germany | | |
| **Post Code** | | | |
| **Suppliers Business Telephone Number** | 01373 467859 | | |
| **Emergency Tel No** | | | |
| **IPT** | | | |
| **REACH Reference Number** | | | |
| **NCage** | | | |
| **Status Comment** | | | |
| **Other Information** | | | |
| **Other Information** | | | |
| **Chemical Content** | Aqueous Solution | | |
| **Related SDS** | | | |

# TYPHOON BATTERY

# Hazardous Data Sheet

**Issue: 4** **Dated: November 2012**

## GUIDE TO SAFETY DATA

### 1. CONTRACTOR'S DETAILS:

NAME OF CONTRACTOR: Hawker GmbH
ADDRESS: PO Box 4280, D-58042, Hagen, Germany
FULL TELEPHONE NUMBER: 00 49 2331 372 475 in the UK — 01373 467859

### 2. IDENTIFICATION OF SUPPLIER AND SUBSTANCE OR PREPARATION:

CONTRACT NO:
DATE:
NATO STOCK NO. (NSN): 61 40-1 2-367 9690
MANUFACTURERS PART NO: 3128985
CHEMICAL NAME: Potassium Hydroxide Solution - **NOTE:** This is contained within the aircraft cell and the nature of the construction, means that the amount free liquid is negligible.
TRADE NAME:
SUPPLIER:
SUPPLIER'S PART NO:
FULL TELEPHONE NO:
MANUFACTURER: Hawker GmbH
FULL TELEPHONE NO: 00 49 37586455 and in the UK — 01373 467859.
Mobile: 07713501865

### 3. CHEMICAL COMPOSITION/INFORMATION ON INGREDIENTS:

Aqueous Solution

### 4. HAZARDS IDENTIFICATION:

Causes Severe Burns

### 5. FIRST AID MEASURES:

SKIN CONTACT: Was with plenty of Water. Immediately remove contaminated clothing
EYE CONTACT: Rinse with plenty of water for at least 10 minutes. Immediately seek medical attention
INGESTION: drink plenty of water. Avoid vomiting. Immediately seek medical attention.
INHALATION: Plenty of fresh air. Seek medical attention.

## 6. TOXICOLOGICAL INFORMATION:

HEALTH EFFECTS: Acute Toxity
a) ROUTES OF EXPOSURE: Skin, eyes
b) ACUTE EFFECTS: Burns
c) CHRONIC EFFECTS: None

## 7. FIRE FIGHTING MEASURES:

Suitable extinguishing media:
In adaption to materials stored in the immediate neighbourhood

## 8. ACCIDENTAL RELEASE MEASURES:

Person - related precautionary measures:
Avoid substances contact

Environmental — protective measures:
Do not allow to meet the sewage/general water system

Procedures for Cleaning/absorption:
Take up with liquid absorbent material for disposal. Clean up affected area

Additional Notes:
Render harmless with dilute sulphuric acid

## 9. HANDLING AND STORAGE:

Handling: Normal handling of the cells/batteries with care.

Storage: Cells/batteries to be stored in standard battery room conditions.

## 10. EXPOSURE CONTROUPERSONAL PROTECTION:

Eye and hand protection required. Standard protective clothing when dealing with Batteries.

## 11. PHYSICAL AND CHEMICAL PROPERTIES:

APPEARANCE: Colourless liquid
ODOUR: Odourless
pH: At 20°C > 13.5
BOILING POINT/RANGE: Not Applicable
MELTING POINT/RANGE: Not Applicable
FLASH POINT: Not Applicable
FLAMMABILITY LIMITS: Not Applicable
AUTO-IGNITION TEMPERATURE: Not Applicable
EXPLOSIVE PROPERTIES: Not Applicable
OXIDISING PROPERTIES: Not Applicable
AMBIENT VAPOUR PRESSURE: Not Applicable
RELATIVE DENSITY: 1.30kg/l
WATER SOLUBILITY: Soluble in water
FAT SOLUBILITY: Not Applicable
OTHER PROPERTIES: Not Applicable
PRESSURE (bar/psi): Not Applicable
PARTITION COEFFICIENT: Not Applicable
OTHER DATA: None

## 12. ECOLOGICAL INFORMATION:

Do not allow to enter water courses, sewage systems or soil.

## 13. DISPOSAL CONSIDERATIONS:

Cells to be disposed in accordance with national regulations for Nickel cadmium Aircraft cells.

## 14. TRANSPORTING INFORMATION:

PROPER SHIPPING NAME: Batteries, Wet, Non-spillable
UN CLASS: 8
UN NUMBER: 2800
PACKAGING GROUP:
CARRIAGE BY ROAD (ADR):
TREMCARD:
CARRIAGE BY SEA (IMDG): 8
CARRIAGE BY AIR (ICAO): 8
HAZARD WARNING LABELS: Yes
IS UN CERTIFIED PACKAGING REQUIRED?:
RECEPTACLE CAPACITY:
PACKAGE TYPE/SIZE:

## 15. REGULATORY INFORMATION:

CHIP INDEX NUMBER: N/A
CLASSIFICATION: N/A
EEC NUMBER: N/A
RISK PHRASES: R20/R21/R22/R35/R36/R37/R40/R43/R50/R53
SAFETY PHRASES: S$^{1}/_{2}$/S2/S22/S26S36/S37/S39/S45/S60/S61

## 16. OTHER INFORMATION:

IS THE ITEM RADIOACTIVE: NO
IF YES' WHAT IS THE ACTIVITY, SUBSTANCE AND FORM (INCLUDING
ISOTOPE)?
IS THE ITEM A RADIOACTIVE "SUBSTANCE": NO
IS THE ITEM A RADIATION "GENERATOR": NO
IF YES' WHAT TYPE OF RADIATION?:
IS THERE ASBESTOS IN THE ITEM: NO
IF YES' WHAT TYPE AND IN WHAT FORM?:
IS THE ITEM MAGNETIC: NO
IF YES' WHAT IS THE READING FOR MAGNETIC FLUX DENSITY, IN WHAT
CONDITION (PACKED OR NOT) AND AT WHAT DISTANCE?

Back to Typhoon contents

SAFETY DATA SHEET

# Nitrogen (Oxygen Free)

**PRODUCT: NITROGEN MSDS NR: 300-00-0023 BOC VERSION: 1.04 DATE: 28/09/06**

## 1 IDENTIFICATION OF THE SUBSTANCE/ PREPARATION AND OF THE COMPANY

| | |
|---|---|
| **Product name** | Nitrogen (Oxygen Free) |
| **Chemical formula** | $N_2$ |
| **Company identification** | See end of page 2. |
| **Emergency phone Nos** | See end of page 2. |

## 2 COMPOSITION/INFORMATION ON INGREDIENTS

| | |
|---|---|
| **Substance/ Preparation** | Substance |
| **Components/ Impurities** | Contains no other components or impurities which will influence the classification of the product. |
| **CAS Nr** | 7727-37-9 |
| **EEC Nr (from EINECS)** | 231-783-9 |

**Specification**

Nitrogen (Oxygen Free) 99.998% minimum
(Specification includes argon) Conforms to BS4366

## 3 HAZARDS IDENTIFICATION

Compressed gas.

In high concentrations may cause asphyxiation.

## 4 FIRST AID MEASURES

**Inhalation** In high concentrations may cause asphyxiation and death. Symptoms may include loss of mobility/ consciousness.

Victim may not be aware of asphyxiation.

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

**Ingestion** Ingestion is not considered a potential route of exposure.

## 5 FIRE FIGHTING MEASURES

**Specific hazards** Exposure to fire may cause containers to rupture/explode. Inform Fire Brigade. Non flammable.

**Hazardous combustion products** None.

**Suitable extinguishing media** All known extinguishants can be used.

**Specific methods** If possible, stop flow of product. Move away from container and cool with water from a protected position.

**Special protective equipment for fire fighters** In confined space use self-contained breathing apparatus.

Ensure adequate air ventilation. Post warning notices.

**Environmental precautions** Try to stop release if safe to do so.

**Clean up methods** Ventilate area.

## 7 HANDLING AND STORAGE

Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature.
Contact BOC if in doubt.
Refer to BOC container handling instructions. Keep container below 50°C in a well ventilated place.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**Personal protection** Ensure adequate ventilation.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Molecular weight** | 28 |
| **Melting point** | -210°C |
| **Boiling point** | -196°C |
| **Critical temperature** | -147°C |
| **Relative density, gas** | 0.97 (air=1) |
| **Relative density, liquid** | Not applicable |
| **Vapour Pressure 20°C** | Not applicable |
| **Solubility mg/l water** | 20 mg/l |
| **Appearance/Colour** | Colourless gas |
| **Odour** | No odour warning properties |

## 10 STABILITY AND REACTIVITY

**Stability and reactivity** Stable under normal conditions.

## 11 TOXICOLOGICAL INFORMATION

**General** No known toxicological effects from this product.

## 12 ECOLOGICAL INFORMATION

**General** No ecological damage caused by this product

SAFETY DATA SHEET

## 13 DISPOSAL CONSIDERATIONS

**General** Do not discharge into any place where its accumulation could be dangerous. To atmosphere in a well ventilated place. Contact BOC if guidance is required.

## 14 TRANSPORT INFORMATION

**Proper Shipping Name** Nitrogen, Compressed

**UN Nr** 1066

**Class/Div** 2.2

**ADR/RID Classification Code** 1A

**ADR/RID Hazard Nr** 20

**Labelling ADR** Label 2.2: non flammable non toxic gas.

**Other transport information** Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers ensure that they are firmly secured and:

- cylinder valve is closed and not leaking.
- valve outlet cap nut or plug (where provided) is correctly fitted.
- valve protection device (where provided) is correctly fitted - adequate ventilation.
- compliance with applicable regulations.

## 15 REGULATORY INFORMATION

**Number in Annex 1 of Dir 67/548** Not included in Annex 1.

**EC Classification** Not classified as dangerous substance.

**Labelling of cylinders**

**- Symbols** Label 2.2: non flammable non toxic gas.

## 16 OTHER INFORMATION

Ensure all national/local regulations are observed.

Asphyxiant in high concentrations.

Keep container in well ventilated place.

Do not breathe the gas.

The hazard of asphyxiation is often overlooked and must be stressed during operator training. Users of breathing apparatus must be trained.

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Do not use any other gas as a substitute for nitrogen.

Always leak check cylinders when first collected, delivered or used, using an approved leak detection fluid.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

For further safety information please refer to "Safety Under Pressure" and "Guidance for carriage of gas cylinders on vehicles", both of which are available from your local BOC outlet.

**CYLINDER CHARACTERISTICS**

| Cylinder size | Max Fill Pressure at 15°C Bar | Approx. Dimensions incl. valve and guard where supplied (mm) | Approx. Gross Cylinder weight (kg) | Manifolded Cylinder Pallets (MCP) | Max Fill Pressure at 15°C Bar | Approx. Dimensions incl. valve and guard where supplied (mm) | Approx. Gross Cylinder Weight (kg) |
|---|---|---|---|---|---|---|---|
| X | 230 | 940 x 140 | 19 | WW (15 x W) | 230 | 1290 x 1810 x 840 | 1500 |
| Y | 230 | 930 x 203 | 40 | WZ (15 x Z)† | 300 | 1290 x 1810 x 840 | 1800 |
| W | 230 | 1460 x 230 | 85 | *QW (12 x W) | 230 | 2000 x 1035 x 850 | 1500 |
| Z† | 300 | 1640 x 230 | 77 | *ZW (20 x W) | 230 | 2080 x 1330 x 1090 | 2300 |
| | | | | *YW (16 x W) | 230 | 2080 x 1120 x 1120 | 1950 |

*Offshore only products.

†Outlet connection: NEVOC Type 30 @ 300Bar

- Outlet connection: 5/8" BSP female right hand cone recessed



**For product and safety enquiries please phone**

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**0800 111 333**

**BOC**
**Customer Service Centre**
**Priestley Road, Worsley**
**Manchester M28 2UT**
**Fax: 0800 111 555**

**In the Republic of Ireland:**
**1850 333 435**

**BOC**
**P.O. Box 201**
**Bluebell, Dublin 12**
**Fax: 01 409 1801**

SFT/007271/APUK/0107/3

SAFETY DATA SHEET

# Oxygen (and High Purity Oxygen)



## 1 IDENTIFICATION OF THE SUBSTANCE/ PREPARATION AND OF THE COMPANY

| | |
|---|---|
| **Product name** | Oxygen |
| **Chemical formula** | $O_2$ |
| **Company identification** | See end of page 2. |
| **Emergency phone Nos** | See end of page 2. |

## 2 COMPOSITION/INFORMATION ON INGREDIENTS

| | |
|---|---|
| **Substance/ Preparation** | Substance |
| **Components/ Impurities** | Contains no other components or impurities which will influence the classification of the product. |
| **CAS Nr** | 7782-44-7 |
| **EEC Nr (from EINECS)** | 231-956-9 |
| **Specifications** | Oxygen 99.5%<br>High Purity Oxygen 99.95%<br>Conforms to BS 4364 : 1993 |

## 3 HAZARDS IDENTIFICATION

**Hazards identification** Compressed gas
Oxidant. Strongly supports combustion. May react violently with combustible materials.

## 4 FIRST AID MEASURES

| | |
|---|---|
| **Inhalation** | Not hazardous. |
| **Ingestion** | Ingestion is not considered a potential route of exposure. |

## 5 FIRE FIGHTING MEASURES

| | |
|---|---|
| **Specific hazards** | Supports combustion<br>Non flammable<br>Exposure to fire may cause containers to rupture/explode.<br>Inform Fire Brigade |
| **Hazardous combustion products** | None |
| **Suitable extinguishing media** | All known extinguishants can be used. |
| **Specific methods** | If possible, stop flow of product.<br>Move away from container and cool with water from a protected position. |
| **Special protective equipment for fire fighters** | None |

## 6 ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| **Personal precautions** | Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources.<br>Post warning notices (including no smoking). |
| **Environmental precautions** | Try to stop release.<br>Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. |
| **Clean up methods** | Ventilate area. |

## 7 HANDLING AND STORAGE

**Handling and storage**

Use no oil or grease.
Open valve slowly to avoid pressure shock. Segregate from flammable gases and other flammable materials in store. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Keep away from ignition sources (including static discharges). Refer to supplier's container handling instructions. Keep container below 50°C in a well ventilated place.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

| | |
|---|---|
| **Personal protection** | Do not smoke while handling product.<br>Wear suitable hand, body and head protection.<br>Avoid oxygen rich (>21%) atmospheres.<br>Ensure adequate ventilation.<br>Clothing impregnated with oxygen should be ventilated by walking in fresh open air for 15 minutes. |

## 9 PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Molecular weight** | 32 |
| **Melting point** | -219°C |
| **Boiling point** | -183°C |
| **Critical temperature** | -118°C |
| **Relative density, gas** | 1.1 (air=1) |
| **Relative density, liquid** | Not applicable |
| **Vapour Pressure 20°C** | Not applicable |
| **Solubility mg/l water** | 39 mg/l |
| **Appearance/Colour** | Colourless gas |
| **Odour** | None |
| **Autoignition temperature** | Not applicable |
| **Other data** | Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level. |

## 10 STABILITY AND REACTIVITY

| | |
|---|---|
| **Stability and reactivity** | May react violently with combustible materials.<br>May react violently with reducing agents.<br>Violently oxidises organic material. |

## 11 TOXICOLOGICAL INFORMATION

| | |
|---|---|
| **General** | No toxicological effects from this product. |

## 12 ECOLOGICAL INFORMATION

| | |
|---|---|
| **General** | No ecological damage caused by this product. |

SAFETY DATA SHEET

## 13 DISPOSAL CONSIDERATIONS

**General** To atmosphere in a well ventilated place.

Do not discharge into any place where its accumulation could be dangerous.
Contact supplier if guidance is required.

## 14 TRANSPORT INFORMATION

**Proper Shipping Name** Oxygen, compressed

**UN Nr** 1072

**Class** 2.2

**Subsidiary risk** 5.1

**ADR/RID Classification Code** 1O

**ADR/RID Hazard Nr** 25

**Labelling ADR** Label 2.2: non flammable non toxic gas

Label 5.1: fire intensifying risk **Other transport information**

Avoid transport on vehicles where the load space is not seperated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers ensure that they are firmly secured and:

- cylinder valve is closed and not leaking
- valve outlet cap nut or plug (where provided) is correctly fitted
- valve protection device (where provided) is correctly fitted
- adequate ventilation.
- compliance with applicable regulations.

## 15 REGULATORY INFORMATION

**Number in Annex I of Dir 67/548** 008–001–00–8.

**EC Classification** O;R8

**Labelling of cylinders**

**- Symbols** Label 2.2: non flammable non toxic gas

Label 5.1: fire intensifying risk.

**- Risk phrases** R8 Strongly supports combustion.

**- Safety phrases** S9 Keep container in well-ventilated place.

S17 Keep away from combustible material, use no oil or grease.

## 16 OTHER INFORMATION

**This product is not suitable for breathing or medical purposes.**

Ensure all national/local regulations are observed. Ensure operators understand the hazard of oxygen enrichment.

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Do not use oxygen as a substitute for air, nitrogen or any other gas.

Always leak check cylinders when first collected, delivered or used using an approved leak detection fluid.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. For further safety information please refer to "Safe Under Pressure" and "Guidance for carriage of gas cylinders on vehicles", both of which are available from your local BOC outlet.

## CYLINDER CHARACTERSITICS

| Cylinder size | Maximum Filled Pressure at 15˚C (bar) supplied | Approx. Dimensions incl. valve and guard where (Kg) (mm) | Approx. Gross Cylinder Weight | Manifolded Cylinder Pallets (MCPs) | Maximum Filled Pressure at 15 | Approx. Dimensions incl. valve & guard where supplied (mm) | Max. Gross Cylinder Weight (Kg) |
|---|---|---|---|---|---|---|---|
| E | 137 | 500 x 150 | 7 | WW (15xW) | 230 | 1290 x 1810 x 840 | 1500 |
| F | 137 | 855 x 140 | 18 | QW† (12 x W) | 230 | 2000 x 1112 x 832 | 1500 |
| X | 230 | 940 x 140 | 20 | ZW† (20 x W) | 230 | 2080 x 1330 x 1090 | 2315 |
| Y | 230 | 910 x 203 | 39 | WN* (15 x N) | 200 | 1290 x 1810 x 840 | 1500 |
| W | 230 | 1460 x 230 | 80 | | | | |
| N* | 200 | 1460 x 230 | 82 | | | | |

† Offshore customers only
*Sizes N and WN only available in High Purity Oxygen
**OUTLET CONNECTION: 5/8" BSP female right hand cone recessed.**

BOC
Member of The Linde Group



All BOC Safety Data Sheets are available online at www.boc.com/uk/sds

**For product and safety enquiries please phone**

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**0800 111 333**
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**Manchester M28 2UT**
**Fax: 0800 111 555**

**In the Republic of Ireland:**
**1850 333 435**
**P.O. Box 201**
**Bluebell, Dublin 12**
**Fax: 01 409 1801**

SAFETY DATA SHEET

# Carbon dioxide

**PRODUCT: CARBON DIOXIDE MSDS NR: 300-00-0005 BOC VERSION: 1.06: DATE: 17/08/06 PAGE: 1/1**

## 1 IDENTIFICATION OF THE SUBSTANCE/ PREPARATION AND OF THE COMPANY

**Product name** Carbon dioxide
**Chemical formula** $CO_2$
**Company identification** see footer
**Emergency phone Nos** see footer

## 2 COMPOSITION/INFORMATION ON INGREDIENTS

**Substance/ Preparation** Substance
**Components/ Impurities** Contains no other components or impurities which will influence the classification of the product.
**CAS Nr** 124-38-9
**EEC Nr (from EINECS)** 204-696-9
**Specification** 99.8%
Conforms to BS 4105 part 1.

## 3 HAZARDS IDENTIFICATION

Liquefied gas under pressure. In high concentrations may cause asphyxiation. When liquid carbon dioxide under pressure is released to atmosphere, the discharge consists of gaseous and solid carbon dioxide only. Slightly corrosive in the presence of moisture. Solid carbon dioxide is white and when in direct contact with the skin will cause acute cold ~~damage to skin – "cold burn". One volume of liquid or solid will~~ give about 500 or 900 volumes of gas, respectively, at ambient conditions.

## 4 FIRST AID MEASURES

**Inhalation** In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Low concentrations of $CO_2$ cause increased respiration and headache. Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

**Skin/eye contact** Immediately flush eyes thoroughly with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

**Ingestion** Ingestion is not considered a potential route of exposure.

## 5 FIRE FIGHTING MEASURES

**Specific hazards** Exposure to fire may cause containers to rupture/explode. Non flammable. Inform Fire Brigade.

**Hazardous combustion products** None

**Suitable extinguishing media** All known extinguishants can be used.

**Specific methods** If possible, stop flow of product. Move away from container and cool with water from a protected position. Inform emergency services of the nature of the product and the possibility of bursting disc rupture (the cylinder is fitted with a bursting disc which will rupture and allow the contents to completely discharge if heat causes the carbon dioxide pressure to exceed the maximum permissible service level). Notify BOC to collect any cylinder(s) involved in a fire. Ensure such cylinders are clearly labelled.

**Special protective equipment for fire fighters** In confined space use self-contained breathing apparatus.

## 6 ACCIDENTAL RELEASE MEASURES

**Personal precautions** Evacuate area. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe: check using a carbon dioxide measuring device. Ensure adequate air ventilation. Post warning notices.

**Environmental precautions** Try to stop release if safe to do so. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

**Clean up methods** Ventilate area.

## 7 HANDLING AND STORAGE

Suck back of water into the container must be prevented. Do not allow backfeed into the container. Normal materials of construction are suitable for dry gas of ambient temperature. Below –30°C only use low temperature carbon steel, austenitic stainless steels, aluminium, copper and their alloys. If carbon dioxide is dissolved in water, particularly at elevated pressures and in the presence of oxygen, use materials resistant to carbonic acid, eg. stainless steel or Monel. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact BOC if in doubt. Refer to BOC container handling instructions. Keep container below 50°C in a well ventilated place. Do not heat cylinder.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**Exposure limits** Carbon dioxide Occupational Exposure Standard (OES):
Long Term Exposure Limit (LTEL) 5000vpm
Short Term Exposure Limit (STEL) 15000vpm

**Personal protection** Ensure adequate ventilation. Carbon dioxide monitoring is recommended if used or stored in a confined space.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

**Molecular weight** 44
**Melting point** –56.6°C
**Sublimation point** –78.5°C
**Critical temperature** 30°C
**Relative density, gas** 1.52 (air=1)
**Relative density, liquid** 0.82 (water=1)
**Vapour Pressure 20°C** 57.3 bar
**Solubility mg/l water** 2000 mg/l
**Appearance/Colour** Colourless gas
**Odour** In high concentrations, a sharp smell may become apparent
**Other data** Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## 10 STABILITY AND REACTIVITY

**Stability and reactivity** Stable under normal conditions.

## 11 TOXICOLOGICAL INFORMATION

**General** High concentrations cause rapid circulatory insufficiency. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness. Carbon dioxide is mildly toxic, with no cumulative effects.

SAFETY DATA SHEET

## 12 ECOLOGICAL INFORMATION

**General** When discharged in large quantities may contribute to the greenhouse effect.

**Global warming factor** 1

## 13 DISPOSAL CONSIDERATIONS

**General**
Do not discharge into any place where its accumulation could be dangerous. Discharge to atmosphere in large quantities should be avoided. Contact BOC if guidance is required.

## 14 TRANSPORT INFORMATION

**PROPER SHIPPING NAME** Carbon Dioxide
**UN Nr** 1013
**Class/Div** 2
**ADR/RID Classification Code** 2A
**ADR/RID Hazard Nr** 20
**Labelling ADR** Label 2.2: non flammable non toxic gas.

**Other transport information** Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured and:
– cylinder valve is closed and not leaking.
– valve outlet cap nut or plug (where provided) is correctly fitted.
– valve protection device (where provided) is correctly fitted. – adequate ventilation.
– compliance with applicable regulations.

## 15 REGULATORY INFORMATION

**Number in Annex I of Dir 67/548** Not included in Annex 1.
**EC Classification** Not classified as dangerous substance.
**Labelling of cylinders – Symbols** Label 2.2: non flammable non toxic gas.

## 16 OTHER INFORMATION

Ensure all national/local regulations are observed.

Asphyxiant in high concentrations.

Keep container in well ventilated place.

Do not breathe the gas.

The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Contact with liquid may cause cold burns and/or frostbite

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Do not use any other gas as a substitute for carbon dioxide. Always leak check cylinders when first collected, delivered or used, using an approved leak detection fluid.

Keep container in well ventilated place.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

For further safety information please refer to "Safe Under Pressure" and "Safe handling, storage and transport of industrial gas cylinders", both of which are available from your local BOC outlet.

**NOTES**

1. Cylinder sizes VB, VK and WV are for vapour withdrawal, LB, LK and WL are for liquid withdrawal. Not all cylinders are available from all locations.

2. This is the outlet connection of the cylinder valve fitted to each cylinder, and which is designed primarily to receive the gas pressure regulator.

3. Each cylinder valve incorporates a bursting disc safety device, designed to rupture at 180-200 bar. Do not tamper with this disc.

* Offshore customer use only.

| Cylinder size | Maximum Filled Pressure at 15˚C (bar) | Approx. Dimensions incl. valve and guard where supplied (mm) | Approx. Full Cylinder weight (kg) | Manifolded Cylinder Pallets (MCP's) | Maximum Filled Pressure at 15˚C (bar) | Approx. Dimensions incl. cylinders (mm) | Max. Gross Weight (kg) |
|---|---|---|---|---|---|---|---|
| VB/LB<br>LR/VR<br>VK/LK | 50<br>50<br>50 | 9400 x 140<br>8700 x 200<br>2300 x 150 | 22<br>44<br>99 | WV/WL<br>(15 x LK/VK)<br>ZK* | 50<br><br>50 | 1280 x 1710 x 830<br><br>1090x1330x2080 | 1700<br><br>2590 |

**OUTLET CONNECTION: Right hand 0.860 in x 14 TPI male.**



All BOC Safety Data Sheets are available online at www.boc.com/uk/sds

**For product and safety enquiries please phone**

**In the United Kingdom:**
**0800 111 333**

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**Priestley Road, Worsley**
**Manchester M28 2UT**
**Fax: 0800 111 555**

**In the Republic of Ireland:**
**1850 333 435**

**BOC Ireland**
**P.O. Box 201**
**Bluebell, Dublin 12**

# Safety Data Sheet

**Product :** **Helium** Page :1/4

MSDS Nr : 300-00-0015BOC(A) Version : 1.04 Date : 18/12/2003

Replaces version dated : 29/07/1994

## 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

| | |
|---|---|
| Product name | Helium |
| Chemical formula | He |
| Company identification | see heading and/or footer |
| Emergency phone numbers | see heading and/or footer |

## 2 COMPOSITION/INFORMATION ON INGREDIENTS

| | |
|---|---|
| Substance/Preparation | Substance. |
| Components/Impurities | Contains no other components or impurities which will influence the classification of the product. |
| CAS Nr | 7440-59-7 |
| EC Nr (from EINECS) | 231-168-5 |

## 3 HAZARDS IDENTIFICATION

| | |
|---|---|
| Hazards identification | Compressed gas<br>In high concentrations may cause asphyxiation.<br>Not classified as dangerous substance. |

## 4 FIRST AID MEASURES

| | |
|---|---|
| Inhalation | In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.<br>Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. |
| Ingestion | Ingestion is not considered a potential route of exposure. |

## 5 FIRE FIGHTING MEASURES

| | |
|---|---|
| Specific hazards | Exposure to fire may cause containers to rupture/explode.<br>Non flammable |
| Hazardous combustion products | None |
| Suitable extinguishing media | All known extinguishants can be used. |
| Specific methods | If possible, stop flow of product.<br>Move away from the container and cool with water from a protected position. |
| Special protective equipment for fire fighters | In confined space use self-contained breathing apparatus. |

## 6 ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| Personal precautions | Evacuate area.<br>Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.<br>Ensure adequate air ventilation. |
| Environmental precautions | Try to stop release. |
| Clean up methods | Ventilate area. |

## 7 HANDLING AND STORAGE

| | |
|---|---|
| Handling and storage | Suck back of water into the container must be prevented.<br>Do not allow backfeed into the container.<br>Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.<br>Refer to supplier's container handling instructions.<br>Keep container below 50°C in a well-ventilated place. |

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

| | |
|---|---|
| Personal protection | Ensure adequate ventilation. |

## 9 PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Molecular weight | 4 |
| Melting point | Not applicable |
| Boiling point | -269 °C |
| Critical temperature | -268 °C |
| Relative density, gas | 0.14 (air=1) |
| Relative density, liquid | Not applicable. |
| Vapour Pressure 20°C | Not applicable. |
| Solubility mg/l water | 1.5 mg/l |
| Appearance/Colour | Colourless gas |
| Odour | None |

## 10 STABILITY AND REACTIVITY

| | |
|---|---|
| Stability and reactivity | Stable under normal conditions. |

## 11 TOXICOLOGICAL INFORMATION

General — No known toxicological effects from this product.

## 12 ECOLOGICAL INFORMATION

General — No known ecological damage caused by this product.

## 13 DISPOSAL CONSIDERATIONS

General — To atmosphere in a well-ventilated place.

Do not discharge into any place where its accumulation could be dangerous.

Contact supplier if guidance is required.

## 14 TRANSPORT INFORMATION

| | |
|---|---|
| Proper shipping name | HELIUM, COMPRESSED |
| UN Nr | 1046 |
| Class | 2.2 |
| ADR/RID Classification code | 1A |
| ADR/RID Hazard Nr | 20 |
| Packing group | None |
| Labelling ADR | Label 2.2: non-flammable non-toxic gas |
| IMDG EmS codes | F-C, S-V |
| IMDG Marine pollutant | No |
| IATA passenger packing instruction | 200 |
| IATA passenger max. quantity/pack | 75kg |
| IATA cargo packing instruction | 200 |
| IATA cargo max. quantity/pack | 150kg |
| Other transport information | Avoid transport on vehicles where the load space is not separated from the driver's compartment.<br>Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.<br>Before transporting product containers ensure that they are firmly secured and:<br>- cylinder valve is closed and not leaking<br>- valve outlet cap nut or plug (where provided) is correctly fitted<br>- valve protection device (where provided) is correctly fitted |

- there is adequate ventilation.
- compliance with applicable regulations.

## 15 REGULATORY INFORMATION

| | |
|---|---|
| Number in Annex I of Dir 67/548 | Not included in Annex I. |
| EC Classification | Not classified as dangerous preparation. |
| Labelling of cylinders | |
| -Symbols | Label 2.2: non-flammable non-toxic gas |

## 16 OTHER INFORMATION

Ensure all national/local regulations are observed.

Asphyxiant in high concentrations.

Keep container in well ventilated place.

Do not breathe the gas.

The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Users of breathing apparatus must be trained.

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or

damage resulting from its use can be accepted.

**End of document.**
**Number of pages :4**

**HSIS Safety Data Sheet**

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| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 6135999680904 | 6135 | 99 | 9680904 |

| Supply Description | |
|---|---|
| **SDS Version** | 2 |
| **Item Name** | Battery, non - rechargeable |
| **Kit Reference** | |
| **Other Description** | Lithium manganese dioxide cells |
| **Commercial Name/Product No*** | Duracell Lithium Manganese Dioxide Battery |
| **Additional Product ID** | |
| **SDS Date** | 10 December 2008 |
| **Manufacturers SDS Reference** | GMEL 2003 6 EU 1st Jul 08 |
| **Supplier** | Signature Industries |
| **Address** | Radio Products Tom Cribb Road Thamesmead London |
| **Post Code** | SE28 0BH |
| **Suppliers Business Telephone Number** | 0193 289 6000 |
| **Emergency Tel No** | |
| **IPT** | M&GS IPT |
| **Army** | NK |
| **Navy** | NK |
| **RAF** | 5J |
| **REACH Reference Number** | |
| **NCage** | K0376 |
| **Status Comment** | |

| Other Information | |
|---|---|
| **Other Information** | This MSDS also cover Duracell Lithium Manganese Batteries Size: CR-V3 123A 223 245 CR2 CP1 28L 1/3N |
| **Chemical Content** | Manganese Dioxide 15-45% 1,2-Dimethoxythane 5-10% Propylene Carbonate 1-10% Lithium 1-5% |
| **Related SDS** | . |

# Safety Data Sheet

## SECTION 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

**Product Name:** DURACELL LITHIUM MANGANESE DIOXIDE BATTERIES **Product Identification**: Lithium Manganese Dioxide Cells –

**Product Use**: Energy Source
**SDS Date of Preparation**: July 1, 2008
**Product Designations:**

| Battery Name/Size | Duracell Designation | Voltage | IEC Designation |
|---|---|---|---|
| Duracell CR-V3 | CR-V3 | 3 | CR-V3 |
| Duracell 123 | 123A | 3 | CR17345 |
| Duracell 223 | 223 | 6 | CR-P2 |
| Duracell 245 | 245 | 6 | 2CR5 |
| Duracell CR2 | CR2 | 3 | CR17355 |
| Duracell CP1 | CP1 | 3 | |
| Duracell 28L | 28L | 6 | 2CR13252 |
| Duracell 1/3N | 1/3N | 3 | CR1108 |

**Company Identification:**

**EU Office**
Procter & Gamble UK.
The Heights, Brooklands
Weybridge, Surrey
KT13 0XP UK
Telephone: +44-1-93-289-6000

**Switzerland Office**
Procter& Gamble
Switzerland SARL
Route de Saint-Georges
47 1213 Petit-Lancy, 1,
Geneva, Telephone: +41-

**US Office**
Duracell, a division of P&G
Berkshire Corporate Park
Bethel, CT 06801 USA
Telephone: 203-796-4000

**Emergency Phone Number**: CHEMTREC 24-Hour Emergency Response Hotline: 703-527-3887 (United States of America)

## SECTION 2: HAZARDS IDENTIFICATION

**Physical Appearance**: Small cylindrical batteries.

CAUTION: Battery can explode or leak if heated, disassembled, shorted, recharged, exposed to fire or high temperature or inserted incorrectly. Keep in original package until ready to use. Do not carry batteries loose in your pocket or purse. Keep batteries away from children. If swallowed, consult a physician at once. For information on treatment, call the NATIONAL BUTTON BATTERY
INGESTION HOTLINE, collect to the United States of America, day or night, at (202) 625-3333. Under certain misuse conditions and by abusively opening the battery, exposed lithium can react with water or moisture in the air causing potential thermal burns or fire.

EU Classification of Preparation: Not classified as a dangerous preparation.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

| Chemical Name | CAS Number | EINECS Number | Amount | Classification |
|---|---|---|---|---|
| Manganese Dioxide | 1313-13-9 | 215-202-6 | 15-45% | Xn, R20/22 |
| 1,2-Dimethoxyethane | 110-71-4 | 203-794-9 | 5-10% | F, Repr Cat 2, Xn, R11, R19, R20, R60, R61 |
| Propylene Carbonate | 108-32-7 | 203-572-1 | 1-10% | Xi, R36 |
| Lithium | 7439-93-2 | 231-102-5 | 1-5% | C, F, R14/15, R34 |
| Lithium Trifluoromethane Sulfonate | 33454-82-9 | 251-528-5 | 0-5% | Xi R36/37/38 |
| Carbon Black | 1333-86-4 | 215-609-9 | 0-5% | None |
| Ethylene Carbonate | 96-49-1 | 202-510-0 | 0-5% | Xi R36/37/38 |
| Graphite | 7782-42-5 | 231-955-3 | 0-5% | None |

## SECTION 4: FIRST AID MEASURES

**General Advice**: The chemicals and metals in this product are contained in a sealed can. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.

**Eye Contact:** If battery is leaking and material contacts the eye, flush thoroughly with copious amounts of running water for 30 minutes. Seek immediate medical advice.

**Skin Contact:** If battery is leaking and material contacts the skin, remove any contaminated clothing and flush exposed skin with copious amounts of running water for at least 15 minutes. If irritation, injury or pain persists, seek medical advice.

**Inhaled:** If battery is leaking, contents may be irritating to respiratory passages. Move to fresh air. If irritation persists, seek medical advice.

**Swallowed:** If battery is swallowed seek immediate medical advice. Batteries lodged in the esophagus should be removed immediately since leakage, caustic burns and perforation can occur as soon as two hours after ingestion. If mouth area irritation or burning has occurred, rinse the mouth and surrounding area with tepid water for at least 15 minutes. Do not give ipecac.

**Note to Physician**: Published reports recommend removal from the esophagus be done endoscopically (under direct visualization). Batteries beyond the esophagus need not be retrieved unless there are signs of injury to the GI tract or a large diameter battery fails to pass the pylorus. If asymptomatic, follow-up x-rays are necessary only to confirm the passage of larger batteries. Confirmation by stool inspection is preferable under most circumstances. For information on treatment, telephone (202) 625-3333, collect to the United States of America, day or night. Potential leakage of dimethoxyethane, propylene carbonate and lithium trifluoromethane sulfonate. Dimethoxyethane rapidly evaporates. Do not give ipecac.

## SECTION 5: FIRE FIGHTING MEASURES

**Fire and Explosion Hazards**: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.

**Extinguishing Media:** Use any extinguishing media that is appropriate for the surrounding fire.

**Special Fire Fighting Procedures:** Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing. Fight fire from a distance or protected area. Cool fire exposed batteries to prevent rupture. Use caution when handling fire-exposed containers (batteries may explode in heat of fire).

**Hazardous Combustion Products:** Thermal degradation may produce hazardous fumes of lithium and manganese; hydrofluoric acid, oxides of carbon and sulfur and other toxic by-products.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

Notify safety personnel of large spills. Irritating vapors and flammable may be released from leaking or ruptured batteries. Eliminate all ignition sources. Evacuate the area and allow the vapors to dissipate. Clean-up personnel should wear appropriate protective clothing to avoid eye and skin contact and inhalation of vapors or fumes. Increase ventilation. Carefully collect batteries and place in an appropriate container for disposal. Remove spilled liquid with absorbent and contain for disposal.

## SECTION 7: HANDLING AND STORAGE

Avoid mechanical or electrical abuse. DO NOT short circuit or install incorrectly. Batteries may explode, pyrolize or vent if disassembled, crushed, recharged or exposed to high temperatures. Install batteries in accordance with equipment instructions. Replace all batteries in equipment at the same time. Do not carry batteries loose in a pocket or bag.

**Storage:** Store batteries in a dry place at normal room temperature.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

The following occupational exposure limits are provided for informational purposes. No exposure to the battery components should occur during normal consumer use. **Refer to specific country regulations for additional exposure limit information.**

| Chemical Name | Exposure Limits |
|---|---|
| Manganese Dioxide | 0,5 mg/m$^3$ TWA UK WEL<br>0,5 mg/m$^3$ TWA (inhalable) DFG MAK<br>0,2 mg/m$^3$ VL Belgium<br>0,2 mg/m$^3$ TWA Denmark LV |
| 1,2-Dimethoxyethane | None established |
| Propylene Carbonate | None established |
| Lithium | None established |
| Lithium Trifluoromethane Sulfonate | None established |
| Carbon Black | 3,5 mg/m$^3$, 7 mg/m3 STEL UK WEL<br>3,6 mg/m$^3$ VL Belgium<br>3,5 mg/m$^3$ TWA Denmark LV |
| Ethylene Carbonate | None established |
| Graphite | 4 mg/m$^3$ TWA UK WEL (respirable dust)<br>10 mg/m$^3$ TWA UK WEL (inhalable dust)<br>1,5 mg/m$^3$ TWA DFG MAK (respirable dust) |

| | |
|---|---|
| | 4 mg/m3 TWA DFG MAK (inhalable dust) 2 mg/m3 VL Belgium (respirable |

**Ventilation:** No special ventilation is needed for normal use.

**Respiratory Protection:** None required for normal use.

**Skin Protection:** None required for normal use. Use butyl rubber gloves when handling leaking batteries.

**Eye Protection:** None required for normal use. Wear safety goggles when handling leaking batteries.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**Appearance and Odor:** Batteries, labeled Duracell®
**Water Solubility:** Insoluble
**Flash Point**: 29°F (-2°C) (1,2-Dimethoxyethane)

## SECTION 10: STABILITY AND REACTIVITY

**Stability:** This product is stable.

**Incompatibility/Conditions to Avoid:** Contents are incompatible with strong oxidizing agents. Do not heat, crush, disassemble, short circuit or recharge.

**Hazardous Decomposition Products:** Thermal decomposition may produce hazardous fumes of lithium and manganese; hydrofluoric acid, oxides of carbon and sulfur and other toxic by-products.

**Hazardous Polymerization:** Will not occur

## SECTION 11: TOXICOLOGICAL INFORMATION

**Potential Health Effects**:

The chemicals and metals in this product are contained in a sealed can. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.

**Eye Contact**: Contact with battery contents may cause irritation.

**Skin Contact**: Contact with battery contents may cause irritation.

**Inhalation**: Inhalation of vapors or fumes released due to heat or a large number of leaking batteries may cause respiratory and eye irritation.

**Ingestion**: Swallowing is not anticipated for larger batteries due to battery size. Smaller batteries may be swallowed. If battery is swallowed, seek immediate medical advice. Batteries lodged in the esophagus should be removed immediately since leakage, caustic burns and perforation can occur as soon as two hours after ingestion. Irritation to the internal/external mouth areas, may occur following exposure to a leaking battery.

**Acute Toxicity Data:**
Manganese Dioxide: LD50 oral rat >3478 mg/kg
1,2-Dimethoxyethane: LDLo oral rat 1000 mg/kg, LCLo inhalation rat 63 g/m3/6 hr
Propylene Carbonate: LD50 oral rat 29100 uL/kg; LD50 dermal rabbit >20 ml/kg; LC50 inhalation rat >5
g/m3
Ethylene Carbonate: LD50 oral rat 10,000 mg/kg; LD50 dermal rabbit >3000 mg/kg
Lithium Trifluoromethane Sulfonate: LD50 oral rat 1250-1500 mg/kg

**Chronic Effects:** The chemicals in this product are contained in a sealed can and exposure does not occur during normal handling and use. No chronic effects would be expected from handling a leaking battery.

**Target Organs:** Skin, eyes and respiratory system.

**Carcinogenicity**: None of the components of this product are listed as carcinogens by the EU Directive on the classification and labeling of substances.

## SECTION 12: ECOLOGICAL INFORMATION

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

## SECTION 13: DISPOSAL INFORMATION

Disposal should be in accordance with national and local regulations. Do not incinerate for disposal except for in a controlled incinerator.

Duracell lithium manganese dioxide batteries are labeled in compliance with the EU Battery Directive 2006/66.

## SECTION 14: TRANSPORT INFORMATION

The transportation of lithium batteries is regulated as UN3090 by ICAO, IATA, IMO and US DOT. However, DURACELL lithium manganese dioxide batteries cells and batteries are not subject to the other provisions of the regulations as long as they are packaged and marked in accordance with the regulations. (The lithium content of cells contained in this document is less than 1 gram.)

DURACELL certifies that all of its lithium batteries meet the requirements of the UN Manual of Tests and Criteria, Part III subsection 38.3. If you assemble these batteries into larger battery packs, it is recommended that you perform the UN Tests to ensure the requirements are met prior to shipment. Cells and batteries are to be separated so as to prevent short circuits and packed in strong packaging, except when installed in equipment. Except when installed in equipment, each package containing more than 24 cells or 12 batteries must be marked indicating that it contains lithium batteries and that special procedures should be following in the event that the packaging is damaged. In addition, each shipment must be accompanied by appropriate documentation and the package must be capable of withstanding the drop test requirements.

Shipping packages containing non-rechargeable lithium batteries must be labeled, regardless of size or number of batteries, with the following statement: “PRIMARY LITHIUM BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT.” The labeling requirement covers shipments via highway, rail, vessel or cargo-only aircraft and covers all shipments inside, into or out of the US. The

label must be in contrasting colour and the letters must be 12 mm (0.5 in) in height for packages weighing more than 30 kg (66 lbs) and 6 mm (0.24 in) in height for packages less than 30 kg (66 lbs).

Except for personal use, the shipment of lithium batteries aboard passenger aircraft is no longer allowed. Airline passengers may continue to have non-rechargeable lithium batteries for their equipment and a reasonable amount of spare non-rechargeable lithium batteries for their equipment in their carry-on luggage – not in their checked baggage. For more information, air travellers should consult the US Department of Transportation (DOT) Safety Travel web site at http://safetravel.dot.gov

## SECTION 15: REGULATORY INFORMATION

**EU Classification of Preparation**: Not classified as a dangerous preparation.

**REACH:** These products are manufactured articles and not subject to REACH registration requirements.

**EU Labeling:** None Required
Labeling is not required because batteries are classified as articles under the both REACH and the
Dangerous Preparations Directive and as such are exempt from the requirement for labeling.

## SECTION 16: OTHER INFORMATION

**P&G Hazard Rating:** Health: 0 Fire: 0 Reactivity: 0

EU Classes and Risk Phrases for Reference (See Sections 2 and 3)
C Corrosive
F Flammable
N Dangerous for the Environment
Repr Cat 2 Toxic to reproduction Category 2
Xi Irritant
Xn Harmful
R11 Very Flammable
R14/15 Reacts violently with water, liberating extremely flammable gases
R19 May form explosive peroxides
R20 Harmful by inhalation
R20/22 : Harmful by inhalation and if swallowed.
R22 Harmful if swallowed.
R34 Causes burns
R35 Causes severe burns
R36 Irritating to eyes
R36/37/38 Irritating to eyes, respiratory system and skin.
R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R60 May impair fertility.
R61 May cause harm to the unborn child.

Data supplied is for use only in connection with occupational safety and health.

**DISCLAIMER**: This SDS is intended to provide a brief summary of our knowledge and guidance regarding the use of this material. The information contained here has been compiled from sources considered by Procter & Gamble to be dependable and is accurate to the best of the Company's

knowledge. It is not meant to be an all-inclusive document on worldwide hazard communication regulations.

This information is offered in good faith. Each user of this material needs to evaluate the conditions of use and design the appropriate protective mechanisms to prevent employee exposures, property damage or release to the environment. Procter & Gamble assumed no responsibility for injury to the recipient or third persons, or for any damage to any property resulting from misuse of the product.


**HSIS Safety Data Sheet**

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| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 681099220503 | 6810 | 99 | 220503 |

| Supply Description | |
|---|---|
| **SDS Version** | 1 |
| **Item Name** | Chromic Trioxide - technical |
| **Kit Reference** | |
| **Other Description** | Chromium VI Oxide - purple crystals |
| **Commercial Name/Product No*** | Chromic Trioxide - Chromic Acid |
| **Additional Product ID** | |
| **SDS Date** | 16 June 2009 |
| **Manufacturers SDS Reference** | 20 March 2006 |
| **Supplier** | Performance Chemicals Ltd |
| **Address** | Fishers Way Belvedere United Kingdom |
| **Post Code** | DA17 6BS |
| **Suppliers Business Telephone Number** | 0870 7700530 |
| **Emergency Tel No** | 0870 7700530 |
| **IPT** | DFG |
| **Army** | NK |
| **Navy** | NK |
| **RAF** | 33G |
| **REACH Reference Number** | |
| **NCage** | U6889 |
| **Status Comment** | |

| Other Information | |
|---|---|
| **Other Information** | |
| **Chemical Content** | CHROMIUM TRIOXIDE >90% |
| **Related SDS** | . |

**Performance Chemicals Ltd**
**Fishers Way**
**Belvedere**
**United Kingdom**
**DA17 6BS**
**Tel: 0870 7700530**
**Fax: 0870 7700531**

## 1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY /

**Product name:** CHROMIUM TRIOXIDE (CHROMIC ACID)

**CAS number:** 1333-82-0

**EINECS number:** 215-607-8

**Index number:** 024-001-00-0

**Synonyms:** CHROMIC ACID

CHROMIUM (VI) OXIDE

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

**Ingredient 1:** CHROMIUM TRIOXIDE >90%

CAS: 1333-82-0

EINECS: 215-607-8

[T] R49; [O] R8; [T] R25; [C] R35; [Sens.] R43; [N] R50/53;

## 3. HAZARDS IDENTIFICATION

**Main hazards:** Explosive when mixed with combustible material. Toxic in contact with skin and if swallowed. Very toxic by inhalation. Causes severe burns. May cause sensitisation by inhalation and skin contact. May cause heritable genetic damage. Toxic: danger of serious damage to health by prolonged exposure through inhalation. May cause cancer by inhalation. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Possible risk of impaired fertility.

## 4. FIRST AID MEASURES (SYMPTOMS)

**Skin contact:** Irritation or pain may occur at the site of contact. Severe burns may occur. Progressive ulceration will occur if treatment is not immediate.

**Eye contact:** There may be pain and redness. Corneal burns may occur.

**Ingestion:** May cause dizziness. Nausea and stomach pain may occur. There may be vomiting. Blood may be vomited. Damage to liver and kidneys may develop later.

**Inhalation:** Exposure may cause coughing or wheezing. There may be congestion of the lungs causing severe shortness of breath.

## 4. FIRST AID MEASURES (ACTION)

**Skin contact:** Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still

[cont...]

on skin. Transfer to hospital if there are burns or symptoms of poisoning.

**Eye contact:** Bathe the eye with running water for 15 minutes. Transfer to hospital for specialist examination.

**Ingestion:** Do not induce vomiting. If substance swallowed is corrosive, give 1 cup of water to drink every 10 minutes. If unconscious, check for breathing and apply artificial respiration if necessary. If unconscious and breathing is OK, place in the recovery position. Transfer to hospital as soon as possible.

**Inhalation:** Remove casualty from exposure ensuring one's own safety whilst doing so. If unconscious, check for breathing and apply artificial respiration if necessary. If unconscious and breathing is OK, place in the recovery position. If conscious, ensure the casualty sits or lies down. If breathing becomes bubbly, have the casualty sit and provide oxygen if available. Transfer to hospital as soon as possible.

## 5. FIRE-FIGHTING MEASURES

**Extinguishing media:** Carbon dioxide. Alcohol resistant foam.

**Exposure hazards:** Toxic. Corrosive. In combustion emits toxic fumes of carbon dioxide and carbon monoxide.

**Protection of fire-fighters:** Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions:** Do not attempt to take action without suitable protective clothing - see section 8 of SDS.

**Environmental precautions:** Do not discharge into drains or rivers. Contain the spillage using bunding.

**Clean-up procedures:** Cover with sodium bisulphite solution using starch iodide paper to test for complete

reduction. Add a small amount of water and mix. Neutralise with dilute sulphuric acid testing with litmus paper periodically. Transfer to a suitable container. Wet

## 7. HANDLING AND STORAGE

**Handling requirements:** Ensure there is sufficient ventilation of the area. Do not handle in a confined space. Avoid direct contact with the substance.

**Storage conditions:** Store in cool, well ventilated area. Keep container tightly closed.

**Suitable packaging:** Do not use steel containers. Do not use aluminium containers.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering measures:** Ensure there is sufficient ventilation of the area.

**Respiratory protection:** Self-contained breathing apparatus must be used in handling.

**Hand protection:** Protective gloves.

**Eye protection:** Safety goggles. Face-shield. Ensure eye bath is to hand.

**Skin protection:** Protective clothing with elasticated cuffs and closed neck. Boots made of PVC. PVC apron covering the tops of the boots. Ensure safety shower is to hand.

[cont...]

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**State:** Crystals

**Colour:** Purple

**Odour:** Odourless

**Oxidising:** Oxidising (by EC criteria)

**Evaporation rate:** Negligible

**Solubility in water:** Soluble

**Also soluble in:** Ethanol.

**Boiling point/range°C:** 250

**Melting point/range°C:** 197

**Relative density:** 2.7

**pH:** 1.1 (1%aq soln)

## 10. STABILITY AND REACTIVITY

**Stability:** Stable under normal conditions.

**Conditions to avoid:** Air.

**Materials to avoid:** Reducing agents. Organic materials. Iron. Copper. Nickel. Aluminium.

**Haz. decomp. products:** In combustion emits toxic fumes of carbon dioxide and carbon monoxide.

## 11. TOXICOLOGICAL INFORMATION

**Routes of exposure** May cause cancer by inhalation. May cause sensitisation by skin contact.

**Toxicity:** CHROMIUM TRIOXIDE

ORL RAT LD50 80mg/kg

## 12. ECOLOGICAL INFORMATION

**Mobility:** Soluble in water.

**Other adverse effects:** Highly toxic to aquatic organisms.

## 13. DISPOSAL CONSIDERATIONS

**Waste disposal:** Cautiously add to an excess of well stirred 5% aqueous sodium bisulphite solution. Stir overnight. If insoluble solids remain, filter and dispose of in an approved landfill site. Neutralise with excess sodium bicarbonate solution. Flush liquors to drain, local regulations permitting, or send to a waste water treatment plant.

**Disposal of packaging** Dispose of in accordance with all applicable local and national regulations.

**NB:** The user's attention is drawn to the possible existence of regional or national

## 14. TRANSPORT INFORMATION

### ADR / RID

**UN no:** 1463
**ADR Class:** 5.1
**Hazard ID no:** 58
**Labelling:** 5.1+8
**Shipping name:** Chromium Trioxide, Anhydrous

[cont...]

## IMDG / IMO

**UN no:** 1463

**Class:** 5.1

**Packing group:** II

**EmS:** 5.1-05

**Marine pollutant:** NO

**Labelling:** 5.1 OXIDISING

## IATA / ICAO

**UN no:** 1463

**Class:** 5.1

**Packing group:** II

**Subsidiary risk:** 8

**Packing instructions:** 511

**Quantity** 25kg

**Labelling:** 5.1 OXIDISING

## 15. REGULATORY INFORMATION

**Hazard symbols:** Oxidising.

Toxic.

Dangerous for the environment.

**Risk phrases:** R9: Explosive when mixed with combustible material.

R24/25: Toxic in contact with skin and if swallowed.

R26: Very toxic by inhalation.

R35: Causes severe burns.

R42/43: May cause sensitisation by inhalation and skin contact.

R46: May cause heritable genetic damage.

R48/23: Toxic: danger of serious damage to health by prolonged exposure through inhalation.

R49: May cause cancer by inhalation.

R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R62: Possible risk of impaired fertility.

**Safety phrases:** S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S53: Avoid exposure - obtain special instructions before use.

S60: This material and its container must be disposed of as hazardous waste.

S61: Avoid release to the environment. Refer to special instructions / safety data sheets.

**Note:** The regulatory information given above only indicates the principal regulations specifically applicable to the product described in the safety data sheet. The user's

attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

## 16. ADDITIONAL INFORMATION

**Additional information:** This safety data sheet complies with the 28th adaption of E.C. directive 67/548/EEC, known in the U.K. as CHIP 3. Emergency Telephone - 07967-745174

**Risk phrases used in s.2:** R49: May cause cancer by inhalation.
R8: Contact with combustible material may cause fire.
R25: Toxic if swallowed.
R35: Causes severe burns.
R43: May cause sensitisation by skin contact.
R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Legal disclaimer:** The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

[final page]

# SAFETY DATA SHEET



## Titanium, Ti

Revision 0
Revision date 24-Jul-2008

## 2. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND THE COMPANY

**Product name** Titanium, Ti

**Company**
Testbourne Ltd
Unit 12,
Hassocks Wood,
Stroudley Road,
Basingstoke,
Hampshire, RG24 8UQ
England
info@testbourne.com
www.testbourne.com

**Fax** +44 (0) 1256 842929

**Emergency telephone number** +44 (0) 1256 467055

**Telephone** +44 (0) 1256 467055

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

**Hazardous ingredients**

| | Conc. | CAS | EINECS | Symbols/Risk phrases |
|---|---|---|---|---|
| Titanium, Ti | 0 - 100% | 7440-32-6 | 231-142-3 | F;R17 Xn;R20 Xi;R36 Xi;R38 |

## 4. HAZARDS IDENTIFICATION

**Main hazards** Spontaneously flammable in air. Harmful by inhalation. Irritating to eyes and skin.

**Other hazards** This material is generally considered to be physiologically inert. There are no reported cases in the literature where titanium as such has caused human intoxication. The dusts of titanium ot most titanium compounds such as titanium oxide may be placed in the nuisance category.

## FIRST AID MEASURES

**Skin contact** May cause redness. Itching. Wash off immediately with plenty of soap and water.

**Eye contact** Irritating to eyes. Itching. Watering. Rinse immediately with plenty of water for 15 minutes holding the eyelids open. Seek medical attention if irritation or symptoms persist.

**Inhalation** Prolonged exposure may cause a red, dry throat, coughing and shortness of breath. If breathing is difficult give oxygen. Seek medical attention. Supply fresh air.

**Ingestion** Drink 1 to 2 glasses of water. If ingested, induce vomiting, but only under medical supervision. Never give anything by mouth to an unconscious person. Seek medical attention.

# Titanium, Ti

Revision 0
Revision date 24-Jul-2008

## FIRE FIGHTING MEASURES

**Extinguishing media** Flammable solid in powder form. If involved in fire, DO NOT USE WATER, CARBON DIOXIDE or HALOGENATED extinguishers. USE dry chemical extinguisher agents, dry sand or dry ground dolonite.

**Fire hazards** May burn in an atmosphere of carbon dioxide, nitrogen or air. May react violently with BrF3, CuO, PbO, (Ni_KClO3), metal oxosalts, halocarbons, CO2 metal carbonates, al water, AgF, O2, nitryl fluoride, HNO3, KClO3, KMnO4, Steam at 704 F, trichloroethylene, trichlorotri-fluoroethane. Titanium in the absence of moisture burns slowly but evolves much heat.

**Protective equipment** Fire may reignite after having been extinguished. Firefighters must wear full face, self -contained breathing apparatus with full protective clothing to prevent contact with skin and eyes.

## ACCIDENTAL RELEASE MEASURES

**Personal precautions** Ensure adequate ventilation of the working area. Wear suitable protective equipment.

**Environmental precautions** Do not allow material to be released into the environment without proper governmental permits.

**Clean up methods** Clean the area using a vacuum cleaner. Transfer to suitable, labelled containers for disposal.

## HANDLING AND STORAGE

**Handling** Ensure adequate ventilation of the working area. Avoid sparks, flames, heat and sources of ignition. Do not breathe dust or vapour.

**Storage** Keep container tightly closed and in a well-ventilated place.

**Suitable packaging** Plastic containers.

## EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering measures** Ensure adequate ventilation of the working area.

**Respiratory protection** Do not breathe dust or vapour. Suitable respiratory equipment.

**Hand protection** Butyl rubber - IIR ([]) Rubber gloves.

**Eye protection** Safety glasses.

**Protective equipment** Wear protective clothing.

## 8. PHYSICAL AND CHEMICAL PROPERTIES

**Description** Powder.

**Colour** Grey.

**Odour** Odourless.

**Boiling point** 3277.0°C

**Relative density** 4.51

**Water solubility** Insoluble decomposes steam at 700-800 C.

**Vapour density** 1.6 (air = 1)

**Melting point** 1677°C

**Autoignition temperature** 250

# Titanium, Ti

Revision 0
Revision date 24-Jul-2008

## 11. STABILITY AND REACTIVITY

**Stability** Stable.

**Conditions to avoid** Will not polymerize.

**Materials to avoid** Air, Aluminium, bromine trifluoride, carbon black, carbon dioxide, metal carbonates, nitrogen, halocarbons, halogens, metal oxides, metal oxosalts, nitric acid, nitryl fluoride, oxidants, oxygen, silver fluoride, steam and acids.

**Hazardous decomposition products** None.

## 10. TOXICOLOGICAL INFORMATION

**Acute toxicity** Irritating to eyes and respiratory system. Prolonged inhalation may cause mild irritation to the lungs and respiratory tract.

**Carcinogenic effects** No carcinogenic effects reported.

## 12. ECOLOGICAL INFORMATION

**Further information** No data is available on this product.

## 13. DISPOSAL CONSIDERATIONS

**Disposal methods** Contact a licensed waste disposal company. Local and national regulations

## 14. TRANSPORT INFORMATION

**ADR/RID**

**UN** 2878 **Packing group** III
**Class** 4.1 **Hazard ID** 40
**Proper Shipping Name** TITANIUM SPONGE, POWDER OR GRANULES .

**IMDG**

**UN** 2878 **Packing group** III
**Class** 4.1 **Marine pollutant** NO
**EmS Code** F-G S-G

**IATA**

**UN** 2878 **Packing group** III
**Class** 4.1 **Subsidiary risk** -
**Packing Instruction** 420 **Maximum quantity** 100 kg **(Cargo)**
**Packing Instruction** 419 **Maximum quantity** 25 kg **(Passenger)**

## 15. REGULATORY INFORMATION

**Symbols** F - Highly flammable; Xn - Harmful

**Risk phrases** R17 - Spontaneously flammable in air.
R20 - Harmful by inhalation.
R36/38 - Irritating to eyes and skin.

**Safety phrases** S22 - Do not breathe dust.
S24/25 - Avoid contact with skin and eyes.
S36/37 - Wear suitable protective clothing and gloves.

# Titanium, Ti

| | |
|---|---|
| Revision | 0 |
| Revision date | 24-Jul-2008 |

## 16. OTHER INFORMATION

**Text of risk phrases in Section 2**

R17 - Spontaneously flammable in air.
R20 - Harmful by inhalation.
R36 - Irritating to eyes.
R38 - Irritating to skin.

**Further information**

The information supplied in this Safety Data Sheet is designed only as guidance for the safe use, storage and handling of the product. This information is correct to the best of our knowledge and belief at the date of publication however no guarantee is made to its accuracy. This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process.

Defence Movements and Transport Policy Division (DMTPD)

Your Safety Assured

**HSIS Safety Data Sheet**

Back to Typhoon contents

| NSN | NSC | Country Code* | NIIN* |
|---|---|---|---|
| 137099965562 | 1370 | 99 | 965562 |

| Supply Description | |
|---|---|
| **SDS Version** | 1 |
| **Item Name** | Signal Kit Personnel Distress |
| **Kit Reference** | |
| **Other Description** | Distress signal |
| **Commercial Name/Product No*** | Signal Kit Pyrotechnic 16mm No 1 Mk 3 Red |
| **Additional Product ID** | H162 |
| **SDS Date** | 05 November 2009 |
| **Manufacturers SDS Reference** | June 2002 |
| **Supplier** | PW Defence Ltd |
| **Address** | Wilne Mill Draycott Derby |
| **Post Code** | DE72 3QJ |
| **Suppliers Business Telephone Number** | |
| **Emergency Tel No** | |
| **IPT** | M&GS IPT |
| **Army** | NK |
| **Navy** | NK |
| **RAF** | 12D |
| **REACH Reference Number** | |
| **NCage** | NK |
| **Status Comment** | |

| Other Information | |
|---|---|
| **Other Information** | |
| **Chemical Content** | No chemical content for this sds |
| **Related SDS** | . |

# MOD SAFETY DATA SHEET

**This data is for authorised use only.**

| | | | |
|---|---|---|---|
| **NATO Stock No:** | **Supply and Classification** | **:** | 1370 |
| | **Country Code** | **:** | 99 |
| | **Item Identification Number** | **:** | 9655622 |

| | | |
|---|---|---|
| **SDS Reference Number** | **:** | 29566 |
| **SDS Version Number** | **:** | 1 |
| **Service ID** | **:** | RAF |
| **SDS Status** | **:** | Issued |
| **Approved Item Name** | **:** | Signal Kit Personnel Distress |
| **Other Description** | **:** | |
| **Commercial Name** | **:** | Signal Kit Pyrotechnic 16mm No. 1 Mk. 3 Red |
| **Equipment Manager / Sponser** | **:** | DGM PYRO Man1 |
| **Manufacturers Item Number** | **:** | H162 |
| **DMC - Army** | **:** | |
| **DMC - Navy** | **:** | |
| **DMC - RAF** | **:** | 12D |
| **DMC - PE** | **:** | |
| **Other ID Numbers** | **:** | |
| **NCAGE** | **:** | |
| **Supplier's Name** | **:** | PW Defence Ltd |
| **Address** | **:** | Wilne Mill<br>Draycott<br>Derby |
| **Postcode** | **:** | DE72 3QJ |
| **Telephone No** | **:** | 01332 871100 |
| **Emergency Telephone No** | **:** | |
| **Suppliers MSDS Ref** | **:** | HWSIS/0154/01 - Dated June 2002 |
| **SDS Issued on** | **:** | 22/10/2004 |
| **Other Information** | **:** | |
| **Related SDS** | **:** | |

**1. Identification of the substance / preparation and company**

HWSIS/0154/01 - Dated June 2002 Inv. No. 04504

PW Defence

PRODUCT SAFETY DATA SHEET

| | |
|---|---|
| Product Name | Signal Kit Pyrotechnic Pistol 16mm No.1 Mk.3 Red |
| Manufacturers Name | PW Defence Ltd. |
| Address | Wilne Mill, Draycott, Derby DE72 3QJ. |
| Telephone No | 01332 871100 |
| P.W.D Ref. No | (H162) |
| Date of Issue | June 2002 |
| Issue No | 01 |

| | |
|---|---|
| Description | Signal kit, which provides an individual with a means of signalling. The flares are contained within a plastic wallet, and are fired by a hand held penjector. On firing a red star is ejected. |

**1. Additional MoD Information**

**2. Composition / information on ingredients**

The pressed star contains a pyrotechnic composition, which consists of Magnesium, Strontium Nitrate, Alloprene (Chlorinated Rubber) and Boiled Linseed Oil with a Gunpowder based primer. The ingredients are sealed in an Aluminium case.

**2. Additional MoD Information**

**3. Hazard identification of the product**

The product respresents no hazard in its unfired form. When fired this product ejects a burning star at high velocity. Always fire vertically.

**3. Additional MoD Information**

**4. First aid measures**

Inhalation (Smoke) - Remove from exposure, keep patient warm. In severe cases obtain medical assistance.

Skin Contact (Internal Composition) - Wash affected areas with copious amounts of water, remove contaminated clothing. If irritation persists seek medical attention.

Eye Contact (Internal Composition) - Irrigate eyes with saline solution for at least 10minutes, obtain medical attention.

Ingestion (Internal Composition) - Keep patient at rest and give copious amounts of water to drink. Do not try to stop patient vomiting. Seek urgent medical attention.

**4. Additional MoD Information**

**5. Fire-fighting measures**

If exposed to flame units will burn with possible projectile effect. Ignited units cannot be extinguished until all of the composition has been consumed.

Use large volumes of water to control burn.

**5. Additional MoD Information**

**6. Accidental release measures**

N/A

**6. Additional MoD Information**

**7. Handling and storage**

Handle the store through United Nations approved packaging and procedures.

**7. Additional MoD Information**

**8. Exposure and personal protection**

When firing, hold penjector at arms length and always point vertically.

Respiratory Protection - None required under normal conditions of use.

Eye Protection - None required under normal conditions of use.

Hand/Skin Protection - None required under normal conditions of use.

The internal composition of the device should never be exposed under normal handling conditions. It however, is an irritant, and should be washed from the skin immediately using good industrial hygiene procedures. Prolonged contact may cause reddening and soreness. Symptoms are temporary once source of irritation is removed.

Ear Protection - None required under normal conditions, however, for situations where the device is used regularly, (for example, training personnel), some form of ear defence is strongly advisable.

Handling/Operation - Use in open spaces. Do not smoke. Keep away from heat sources of ignition
ONCE IN OPERATION, FOLLOW INSTRUCTIONS, DO NOT MIS-USE, DO NOT DISMANTLE THE PRODUCT.

**8. Additional MoD Information**

**9. Physical and Chemical properties**

| | |
|---|---|
| Appearance | The kit consists of a pen sized penjector and eight screw on cartridges in a weatherproof plastic pack. |
| Stability in Water | N/A |
| Reaction with Water | N/A |

**9. Additional MoD Information**

**10. Stability and reactivity**

Pyrotechnic composition is sealed within the product. The product is stable and conforms to international requirements. Auto ignitions temperature is greater than 250° C.

**10. Additional MoD Information**

**11. Toxicological information**

Ingredients

There is no risk of dust from the composition (except where fragmentation and abrasion occur) under normal handling conditions.

The internal composition is harmful by ingestion.

Each product contains the chemicals in the following table, occupational exposure limits and toxicological data are included:-

| Chemical | (LD50, ORAL, RAT) mg/kg | OEL (Total Dust) (Long Term, 8Hr TWA) |
|---|---|---|

| | | |
|---|---|---|
| Strontium Nitrate | 2750 | 10mg/m3 |
| Magnesium | No data | _ |
| Alloprene (Chlorinated Rubber) | >5000 | _ |
| Boiled Linseed Oil | No data | _ |

*These chemcials exhibit systemic and possible mutagenic or teratogenic properties (reproductive effects).

Note - Where O.E.L. figures are not given this is because they have not been assigned as at EH40/2000.

**11. Additional MoD Information**

**12. Ecological considerations**

N/A

**12. Additional MoD Information**

**13. Disposal considerations**

| | |
|---|---|
| Disposal | Spent units may be disposed of with household waste, time expired units may be returned to manufacturer via point of sale. |

**13 Additional MoD Information**

**14. Transport information**

| | |
|---|---|
| Hazard Class | 1.3G |
| UN Number | 0054 |
| Proper Shipping Name | Cartridges, Signal |
| Transport Restrictions | Forbidden by passenger aircraft |
| NATO Stock No. | 1370-99-965-5622 |

**14. Additional MoD Information**

**15. Regulatory information**

| | |
|---|---|
| Classification | N/A |
| Hazard Symbol | N/A |
| Risk Phrases | N/A |
| Safety Phrases | N/A |

**15. Additional MoD Information**

**16. Other information**

The product is designed to be hand held, for use in emergency and signalling situations.
When user instructions are followed, this product represents minimal risk to the user and those in the general vicinity of the point of use. Packs include NATO night markings. A firearms certificate is required to purchase this product.

The above information is given based on the present state of our knowledge of this product and at the time of publication, it is given in good faith. No warranty is implied with respect to the quality or the specification of this product. The user must satisfy themselves that the product is entirely suitable for their purpose.

Signed ..... Tracey Salt - Chief Chemist

Signed ..... Peter Swann - Research & Development Manager



**16. Additional MoD Information**

# Chromate primer paints

**Engineering Sheet No 32**

## Introduction

Because of their special properties various chromate pigments are often used in anti-corrosive primer paints. They include: basic zinc chromate/ alkali chromate; basic potassium zinc chromate; basic zinc chromate (zinc tetroxy chromate); strontium chromate; calcium chromate; lead chromate.

The zinc chromates listed above are the pigments most commonly used in primer paints. However, many variants exist and may be used for special effects. These variants are likely to present health hazards similar to those listed below. The advice given below on the hazards and precautions to be taken will therefore, also be relevant to them.

Although primarily used in wet paints, chromate pigments may also be used in powder coating applications.

The use of calcium chromate in paints is now rare and it may only be available as an imported material.

Lead chromates are primarily used in topcoat paints, but they may also be added to primer paints to provide colouring. In addition to the guidance on chromium VI set out below, these paints are also subject to the requirements of the Control of Lead at Work Regulations 1998.[1]

## Hazards

The adverse effects on health associated with exposure to chromium and its inorganic compounds vary according to valency state and water solubility, but it is the compounds of hexavalent chromium (chromium VI) which are of most concern. All chromates, dichromates and polychromates fall into this category.

There are few data on the actual effects of exposure to chromium VI in primer paints. The health hazards listed below are those associated with chromium VI compounds, rather than fully established hazards associated with primer paints. They relate to inhalation of dust, mist and spray, or contact with the skin and eyes. The actual risks arising from use of primer paints containing chromium VI may not be as high as that indicated by the hazards below. Employers should have regard to them when carrying out assessments, to ensure that all hazards have been considered.



chromate pigments used in paints have now been classified as carcinogenic to a varying degree (see table below).

Other effects associated with the inhalation of dust, mist or spray from chromate compounds are: (a) chemical irritation of the bronchial tubes (bronchospasm); (b) the development of occupational asthma through respiratory sensitisation; and (c) ulceration of the mucous membranes of the nose which may progress to perforation of the nasal septum.

***Skin:*** The effects of chromate compounds on the skin include: (a) primary irritant reactions which may progress to ulceration. This is particularly the case where skin cuts and abrasions already exist; (b) allergic contact dermatitis. The skin may be red and inflamed and have an identical appearance to eczema.

***Eyes:*** Direct contact and contamination of the eyes can result in irritation, and possibly ulceration of the cornea.

Some key hazard features following recent classification under CHIP of the main chromate pigments used in primer paints are given in the following table.

| | | | |
|---|---|---|---|
| Zinc chromates inc. zinc potassium chromate | Carc.Cat 1 R45 | Xn; R22 | R43 |
| Strontium chromate | Carc.Cat 2 R45 | Xn; R22 | —— |
| Calcium chromate | Carc.Cat 2 R45 | Xn; R22 | |
| Lead chromate | Carc.Cat 3 R40 | Repr.Cat1R61 Repr.Cat3R62 | R33 |
| Other Cr VI compounds - except barium chromate and those specified elsewhere in the Approved Supply List | Carc.Cat 2 R49 | | R43 |

**KEY**: Carc.- Carcinogen; Cat.- Category; Xn - Harmful; Repr.- toxic for reproduction; R22 - Harmful if swallowed; R33 - danger of cumulative effects; R40 - possible risk of irreversible effects; R43 - may cause sensitisation by skin contact; R45 - may cause cancer; R49 - may cause cancer by inhalation; R61 - may cause harm to the unborn child; R62 - possible risk of impaired fertility

## Who is at risk?

As well as those directly handling and applying the paints, anyone in the vicinity is at risk of exposure. They may inhale dust, mist or spray given off during application, and/or come into direct skin or eye contact with the paints.

Those at risk of exposure also include people working on articles previously coated with such paints, eg rubbing down or sanding painted articles, or doing 'hot work' on them such as cutting, welding and brazing.

People maintaining or cleaning plant and equipment which used to apply or contain such paints may be at risk.

## Occupational Exposure Limits

Chromium VI compounds have a maximum exposure limit (MEL) of 0.05 mg/m$^3$ 8-hour time weighted average (TWA), as chromium.

MELs have a legal status explained in the COSHH *General* ACOP [2] and EH40 *Occupational Exposure Limits.*[3] For a substance which has been assigned a MEL, exposure must be reduced to the lowest level that is reasonably practicable, and in any case below the MEL.

With lead chromate, provided the lead in air standard (0.15 mg/m$^3$ 8-hour TWA) is met, the MEL for chromium VI compounds will not be exceeded, but exposure must still be reduced so far as is reasonably practicable.

## Prevention and control of exposure

Under COSHH employers and the self-employed m ust: (a) carry out a proper assessment of the health risks arising from the handling and application of chromate primer paints and/or treatment of articles coated with such paints, together with the precautions necessary to prevent or adequately control them. This may require air sampling and biological monitoring. Remember to include all people who may be exposed; (b) prevent exposure to the chromate primer paints or, where this cannot reasonably be done, adequately control the exposure.

Since all the main chromate pigments used in chromate primer paints, except lead chromate, are now classified under CHIP as Category 1 or 2 carcinogens, any assessment relating to them must also take account of: (a) the *COSHH Carcinogens ACOP;* [1] (b)COSHH regulation 7(3) which requires employers to take specific measures to control exposure; and (c) COSHH regulation 7(9) which requires in the event of a control measure failure that only specified people, adequately equipped, are allowed into the affected areas and everyone who may be affected told of the failure.

*Prevention of exposure*: This should always be considered first. It may be possible to substitute the chromate-based primer with another less hazardous paint able to achieve the performance specifications required. Chromate-based paint should only be used if a suitable alternative is not reasonably practicable, based on proper risk assessment and the technical requirements of the job. Further guidance on these issues is given in Reference 4.

*Control of exposure:* Where chromate primer paints are to be used, exposure must be adequately controlled by a suitable combination of engineering and process control measures, along with the use of personal protective equipment (PPE), as appropriate.

The provision of adequate control depends on: (a) keeping personal exposures as low as is reasonably practicable and at least below the MEL, through good engineering controls and systems of work; (b) the proper use of suitable PPE to avoid skin or eye contact and, where necessary, prevent inhalation of dust, mist or spray; (c) high standards of housekeeping to prevent or minimise contamination; and (d) good personal hygiene standards. Skin cuts and abrasions, in particular, should be protected from contamination.

Engineering control systems may comprise total enclosure of the process or use of local exhaust ventilation systems. Small items may therefore be sprayed in small extracted enclosures with a small aperture for the spray gun, with larger items in suitably designed spray booths to minimise exposure to the hazardous spray. Extraction should always be designed to take spray away from the worker's breathing zone.

Further specific measures which may be required under regulation 7(3) of COSHH include:

(a) minimising the number of persons exposed and periods of exposure;

(b) prohibiting smoking, eating and drinking in contaminated areas;

(c) regularly cleaning work surfaces by a suitable safe method, to minimise contamination;

(d) the provision of suitable washing and changing facilities near at hand;

(e) demarcating potentially contaminated areas and displaying suitable warning signs;

(f) safe storage, handling and disposal of chromate primer paints;

(g) use of closed and clearly labelled containers.

The *COSHH General ACOP* [1] and *COSHH Carcinogens ACOP* [2] give further advice on the measures to be taken.

## Respiratory protective equipment

Where control measures such as enclosure and exhaust ventilation are not practicable, or are not sufficient to control exposure, respiratory protective equipment (RPE) should be worn. RPE may particularly be required for exposures of short duration where permanent

installation of other control measures is not reasonably practicable.

RPE is essential for all spraying of chromate paints, unless the spraying operation is enclosed within very well designed extracted spray booths. It may also be necessary for certain cleaning or maintenance work. RPE must be suitable for the circumstances in which it is to be used. This means that it must provide adequate protection, must fit the wearer, must be used in accordance with the manufacturers' instructions and be 'CE' marked.

RPE for use when spraying chromate paints should usually comprise a correctly fitted full-face mask (to BS EN136) attached to compressed airline breathing apparatus. Breathing apparatus should be either light duty (to prEN 12419), heavy duty (to BS EN139) or self-contained (to BS EN137). Full face masks are recommended because they give a better face seal (hence better protection), provide wide and unobstructed vision, and protect the eyes and face from splash or spray. Guidance on these issues is given in Reference 5.

Other personal protective equipment (PPE) including suitable protective clothing, gloves, footwear and eye protection should always be worn where there is any risk of skin contact through handling, application, leaks, spillage or splashing etc of the chromate primer paints.

When sanding, rubbing down, or undertaking 'hot work' on articles coated with chromate paints careful consideration should be given to methods which will minimise and adequately control exposure to any dust or fume generated. Wet sanding methods and/or local extract ventilation along with suitable PPE should be used.

Proper attention should also be given to the recommendations and conditions of use provided on the paint manufacturer's or supplier's CHIP labels and in safety data sheets and other technical information.

**Maintenance of control measures**

All control measures should be maintained in efficient working order and good repair at all times. Under COSHH, extract ventilation systems in particular must be examined and tested by a competent person at least once in every 14 months, and appropriate records kept. It is recommended that all engineering control measures in use also receive frequent visual inspections at least weekly.

Preventative maintenance procedures should indicate which engineering control measures require servicing, the nature of the work to be carried out, by whom, and how any defects found will be put right.

PPE should also be properly maintained, replaced as necessary, cleaned and suitably stored when not in use.

RPE should be regularly maintained in accordance with the manufacturers' instructions to ensure that it remains effective. Maintenance includes replacing filters, cleaning, disinfection, examination, repair, testing and record keeping.

**Monitoring exposure**

Where exposure to chromate primer paints can occur, monitoring may be required to ensure the effectiveness of control measures and ensure that exposure levels are being kept below the MEL and as low as is reasonably practicable. Remember, though, that air sampling will not indicate irsks associated with any possible skin and eye contact. Biological monitoring may also be appropriate to help establish the full extent of exposure by all routes. While biological monitoring can be used to ascertain the body burden of a particular chemical, it should not be used as the sole means of assessing the level of risk.

Further guidance is given in the *COSHH General ACOP*,[2] and references 6 and 7.

The recommended method for measurement of chromate primer paints as chromium VI compounds is contained in Reference 8.

**Health surveillance**

The need for health surveillance and its extent should be determined as part of the COSHH assessment and may to be required where employees are exposed to chromate primer paints.

Where health surveillance is necessary it should be carr ied out under the direction of a suitably qualified health professional, eg occupational health doctor or nurse.

Further information is given in the *COSHH General ACOP*,[2] *COSHH Carcinogens ACOP*,[2] and Reference 9.

The surveillance may include initial health assessment with specific reference to any skin conditions and any nasal or respiratory symptoms along with periodic health assessment, lung function test and biological monitoring involving assessment of chromium in urine, as appropriate.

Regular skin inspection of hands and forearms should be carried out by an occupational health professional or, where appropriate, by a suitably trained responsible person. An effective system should be provided for reporting to a responsible person any skin complaint, nasal or respiratory symptoms, or other effects which may be attributable to exposure to chromate pigments.

Medical opinion should be sought where ill-health effects are identified, so that prompt remedial action can be taken.

Further information is contained in References 10, 11 and 12.

In addition to the above, suitable health records for exposure to chromate pigments as a carcinogen will need to be kept. See Appendix to the *COSHH General ACOP*[2] *and the COSHH Carcinogens ACOP*[2] for details.

**Information, instruction and training**

Employers must provide their employees and any others at risk with such information, instruction and training as is sufficient for them to know: (a) the risks to health arising from exposure to chromate primer paints; typical symptoms of exposure; and (b) the precautions which must be taken. This includes, in particular, details of how control measures are to be used, reporting defects and the proper use and maintenance of RPE.

Results of any monitoring of exposure, and information on the collective results and conclusions of any health surveillance carried out should also be provided.

**References (HSE Books)**


1 *The control of lead at work: Approved Code of Practice, Regulations and Guidance* COP2

ISBN 0 7176 1506 5

2 *General COSHH ACOP and Carcinogens ACOP and Biological agents ACOP. Control of Substances Hazardous to Health Regulations 1999* L5

ISBN 0 7176 1670 3

3 *EH40: Occupational Exposure Limits 1999* (revised annually) ISBN 0 7176 1660 6

4 *Seven steps to successful substitution of hazardous substances* HSG110 ISBN 0 7176 0695 3

5 *The selection, use and maintenance of respiratory protective equipment: a practical guide* HSG53

ISBN 0 7176 1537 5

6 *Monitoring strategies for toxic substances* HSG173 ISBN 0 7176 1411 5

7 *Biological monitoring in the workplace: a guide to its practical application to chemical exposure* HSG167 ISBN 0 7176 1279 1

8 *Total hexavalent chromium compounds in air-colorimetric* ISBN 0 11 885920 X (out of print and therefore not available through HSE Books; photocopy available from the British Library).

9 *Health surveillance under COSHH: guidance for employers* ISBN 0 7176 0491 8

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**Further information (HSE Books)**

*Chromium and its inorganic compounds: health hazards and precautionary measures* EH2(rev)

ISBN 0 7176 1502 2

*Chromium and you* MSA16 1991 HSE leaflet

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.




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