



MOTORS

Technical Information

ATEX instruction for OMS



together in motion

White is a leading global provider of motor and steering solutions that power the evolution of mobile and industrial applications around the world.



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Chapter 1

General Information

Topics:

- *ATEX introduction*
- *Explosive atmosphere*
- *Maximum surface temperature for OMS*

ATEX introduction

Hydraulic Orbital Motors are designed for mobile and stationary applications. Some motors are used in related applications, where locations are classified as hazardous areas.

The ATEX Directive 2014/34/EU specifies the minimum safety requirements for equipment intended for use in potentially explosive atmospheres in European Union member states. ATEX is derived from the French term “**AT**mosphères **EX**plosives”.

The equipment intended for use in hazardous areas are divided into two groups:

Group I: Equipment intended for use in underground parts of mines (mining equipment).

Group II: Equipment intended for use in other places than mines (non-mining equipment).

The hydraulic orbital motors are intended for use in Group II applications.

Explosive atmosphere

Explosion triangle

A “hazardous area” is defined as an area in which the atmosphere contains, or may contain in sufficient quantities, flammable or explosive gases, dusts or vapors. In such an atmosphere a fire or explosion is possible when three basic conditions are met. This is often referred to as the “hazardous area” or “explosion” triangle.

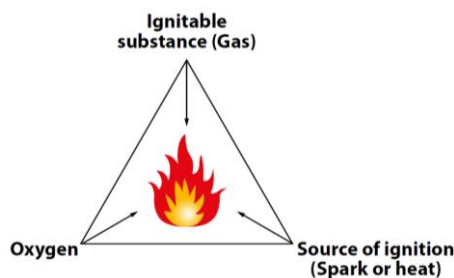


Figure 1 Explosion triangle

An atmosphere with the potential to become an explosive atmosphere during operating conditions and/or under the influence of the surroundings is defined as a potentially explosive atmosphere. Products covered by directive 2014/34/EU are defined as intended for use in potentially explosive atmospheres. Removing one of the elements eliminates all risk of explosion.

General zone classification

Directive 99/92/EC divides the Hazardous areas into zones and defines criteria by which products are categorized within these zones; Zone 0 / 20 is the most restrictive and Zones 1 / 21 and 2 / 22 are less restrictive. The following table describes the zones in an installation where there is a potential for explosive atmospheres. The owner of the installation must analyze and assess the area in which the explosive gas/dust mixture may occur, and if necessary must divide it into zones. This process of zoning then allows the correct plant and equipment to be selected for use in the area.

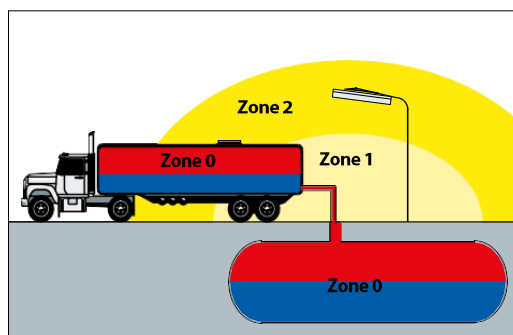


Figure 2 Zone classification

Zones		Presence of potentially explosive atmosphere	Type of risk
Gas (G)	Dust (D)		
0	20	Present continuously or for long periods	Permanent
1	21	Likely to occur in normal operation occasionally	Potential
2	22	Not likely to occur in normal operation but. If it does occur, will persist for a short period of time	Minimal

Table 1 Zone classification

Equipment category and zones

Mechanical components with potential ignition sources e.g. components containing non-conductive materials or layers or components with hot surface are covered by the ATEX-directive.

Non-mining equipment for potentially explosive atmosphere is classified as:

Equipment Group II – this group comprises three categories according to the level of safety provided:

- Category 1
- Category 2
- Category 3

Category 1 equipment has the highest degree of protection – see the following below.

Degree of protection	Protection	Category
Very high	Two independent protection measures or safe if two errors occur independently	Category 1
High	Safe in normal operation and in anticipated case of commonly occurring errors	Category 2
Normal	Safe in normal operation	Category 3

Table 2 Degree of protection

These products have to fulfil all requirements in the ATEX directive, and have to be marked with the required “Ex” marking.

Equipment located in zone specified areas must fulfil the following requirements (see also the following figure):

- **Category 1** – approved equipment can be installed in hazardous areas zone 0 / 20, zone 1 / 21, zone 2 / 22 and outside zone categorized areas.
- **Category 2** – approved equipment can be installed in hazardous areas zone 1 / 21, zone 2 / 22 and outside zone categorized areas.

- **Category 3** – approved equipment can be installed in hazardous areas zone 2 / 22 and outside zone categorized areas.

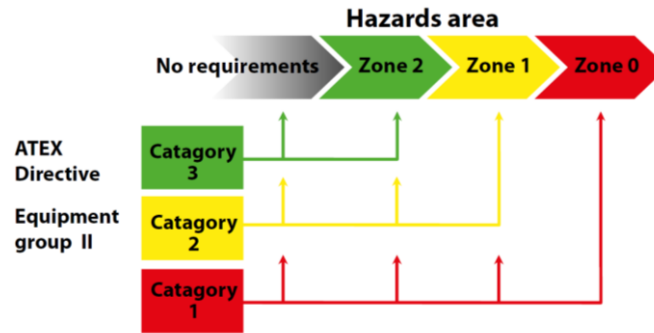


Figure 3 Hazard areas

Marking of ATEX motors

The OMS motor is marked for application in gaseous and dusty environments according to the below:



Figure 4 Example label

1. CE Conformity marking
2. EU marking (per 2014/34/EU) - Directive part

Description	EU Marking
CE conformity marking	CE
Explosion protection marking	
Equipment group	II
Equipment Category	2G / 2D

Table 3 ATEX label 2

3. EU marking (per EN ISO 80078-36:2016 Standard part)

Description		EU Marking
Protection principle		h
Explosion protection marking		Ex
Equipment group		II / III
Equipment protection level (EPL)		Gb / Db
OMS	Gas	T5...T3
	Dust	T115°C...T185°C
OMSS	Gas	T5...T3
	Dust	T85°C...T135°C

Table 4 ATEX label 3

Definition	Level of protection	Typical zone of application	EN ISO		EU	
			EPL	Group	Category	Group
Gas atmosphere	Very high	0	Ga	II	1G	II
	High	1	Gb		2G	
	Enhanced	2	Gc		3G	
Dust atmosphere	Very high	20	Da	III	1D	II
	High	21	Db		2D	
	Enhanced	22	Dc		3D	

Table 5 EPL/Equipment category

4. See item 3
5. Min and max ambient temperature (see [Maximum surface temperature for OMS](#))
6. Manufacturer
7. Motor type and displacement
8. Code number
9. Production number, date, and series number

Example of item 9: **W95123094**

W Manufacturing location (W = Wrocław)

9 Year 2019

51 Week 51

2 Tuesday (1 = Monday)

3094 Consecutive number

Maximum surface temperature for OMS

T codes for OMS motors – Gaseous environment (Group II)

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	T5	T4	T4
≤ 60 °C [140 °F]	T4	T4	T4
≤ 80 °C [176 °F]	T4	T4	T3

Table 6 OMS and OMSS motors - Maximum fluid and ambient temperature

Classification of maximum surface temperatures for Group II equipment

Temperature class	Maximum surface temperature	
	°C	[°F]
T3	200	[392]
T4	135	[275]
T5	100	[212]

Table 7 Classification of maximum surface temp for Group II equipment

Note:

For Group II with T4 classification it is acceptable that small surface areas (total areas $\geq 20 \text{ mm}^2$ and $\leq 1000 \text{ mm}^2$) can have surface temperature up to 200 °C.

For T5 classification it is acceptable that small surface areas (total areas $\leq 1000 \text{ mm}^2$) can have surface temperature up to 150 °C.

Maximum surface temperature – Dusty environment (Group III)

Maximum oil temperature	Maximum ambient temperature		
	$\leq 20 \text{ °C [68 °F]}$	$\leq 40 \text{ °C [104 °F]}$	$\leq 60 \text{ °C [140 °F]}$
$\leq 40 \text{ °C [104 °F]}$	115 [239]	135 [275]	155 [311]
$\leq 60 \text{ °C [140 °F]}$	130 [266]	150 [302]	170 [338]
$\leq 80 \text{ °C [176 °F]}$	145 [293]	165 [329]	185 [365]

Table 8 OMS motors - Maximum surface temperatures

Maximum oil temperature	Maximum ambient temperature		
	$\leq 20 \text{ °C [68 °F]}$	$\leq 40 \text{ °C [104 °F]}$	$\leq 60 \text{ °C [140 °F]}$
$\leq 40 \text{ °C [104 °F]}$	85 [185]	95 [203]	105 [221]
$\leq 60 \text{ °C [140 °F]}$	100 [212]	110 [230]	120 [248]
$\leq 80 \text{ °C [176 °F]}$	115 [239]	125 [257]	135 [275]

Table 9 OMSS motors (short motor) - Maximum surface temperatures

Note:

Above maximum surface temperatures are without any deposited dust on the motors. The possible insulation effect of a dust layer on the surface has to be taken into account by the safety margin to the minimum ignition temperature of the dust concerned. For up to 5 mm [1.97 in] layer thickness the safety margin is 75 °C [167 °F]. For further information please see IEC 60079-14.



Warning:

The above operating temperatures (ambient and oil) of the motor must be guaranteed by the end user.



Warning:

It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the motor. See also Oil types / Operating fluids.

Chapter 2

Versions and code numbers

Topics:

- *OMS standard motor*
- *OMS short motor*

OMS standard motor

OMS with standard 4 hole flange

Spigot diameter	Ø82.5mm [3.25 in]						
Bolt circle diameter	Ø106.4 mm [4.20 in]						
Shaft	Main Port size	Drain Port size	Check valve	European version	US version	Main type designation	Conf. code
Cyl. Ø32 mm	G 1/2	G 1/4	X	X	-	OMS	A1
Splined 1.25 in	G 1/2	G 1/4	X	X	-	OMS	A2
Cyl. Ø32 mm	G 1/2	G 1/4	X	-	X	OMS	A3

Table 10 Mounting flange: Standard 4 hole flange

Code numbers

Conf. code	Displacement								
	80	100	125	160	200	250	315	400	500
A1	11159819	11159820	11159821	11159822	11159823	11159824	11159825	11159826	11159827
A2	11159828	11159829	11159830	11159831	11159832	11159833	11159834		
A3	11181957	11181958	11181959	11181960	11181961	11181972			

Table 11 Code numbers: OMS Standard 4 hole flange

OMS short motor

OMS short

Spigot diameter	Ø100 mm [3.94 in]				
Bolt circle diameter	Ø125 mm [4.92 in]				
Shaft	Main port size	Drain port size	Check valve	Main type designation	Conf code
No output shaft	G 1/2	G 1/4	X	OMSS	D1

Table 12 Mounting flange: Short

OMS with Short flange code numbers

Conf. code	Displacement								
	80	100	125	160	200	250	315	400	500
D1	11159837	11159838	11159839	11159840	11159841	11159842	11159843	11159844	

Table 13 Code numbers: Short

Chapter 3

Technical specifications

Topics:

- *Technical specification for OMS motors*
- *Ambient temperature*
- *Oil types / Operating fluids*

Technical specification for OMS motors

All necessary design information for instance maximum pressure rating, maximum flow, maximum radial load etc. is provided in the Technical Information catalogues.

The rated data which we publish in our Technical Information is based on the use of premium mineral based hydraulic oil with a viscosity of 35 mm²/s.

Ambient temperature

Maximum ambient temperature depends on the requested ATEX class needed – please see Maximum surface temperature for OMS

In general, the ambient temperature should be between -30 °C [-22 °F] and +60 °C [+140 °F].

Oil types / Operating fluids

In a hydraulic system the most important task of the oil is to transfer energy. At the same time the oil must lubricate moving parts in hydraulic components, protect them from corrosion, and transport dirt particles and heat out of the system. To ensure that hydraulic components operate without problems and have long operating life it is therefore vital to select the correct oil type with the necessary additives.

Ratings and performance data are based on operating with hydraulic fluids containing oxidation, rust and foam inhibitors. These fluids must possess good thermal and hydrolytic stability to prevent wear, erosion and corrosion of motor components.

Mineral oils for OMS motors

For systems containing mineral hydraulic oil with anti-wear additives, type HLP [DIN 51524] or HM (ISO 11158) **must be used**.

Mineral oils without anti-wear additives or engine oils can also be used, provided operating conditions are suitable.



Warning:

It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the motor. Maximum surface temperature can be found under: [Maximum surface temperature for OMS](#).

Mixing oils of different brands or different oils of the same brand may lead to the formation of sediment and sludge. Consequently, a rapid, irreversible deterioration of the system is induced.

Oil temperature

Maximum oil temperature depends on the requested ATEX class needed. See [Maximum surface temperature for OMS](#).

Under normal operating conditions it is recommended to keep the temperature in the range of 30 °C [86 °F] to 60 °C [140 °F].

Fluid temperature affects the viscosity of the fluid and resulting lubricity and film thickness. High temperatures can also limit seal life, at most nonmetallic materials are adversely affected by use at elevated temperatures.

Fluids may break down or oxidize at high temperature, reducing their lubricity and resulting in reduced life of the unit. Oil life is greatly reduced if its temperature exceeds +60 °C [+140 °F]. As a general rule, oil life is halved for each 8 °C [46 °F] its temperature exceeds +60 °C [+140 °F]

Viscosity

Maintain fluid viscosity within the recommended range for maximum efficiency and bearing life. Minimum viscosity should only occur during brief occasions of maximum ambient temperature and severe duty cycle operation.

Maximum viscosity should only occur at cold start. Limit speeds until the system warms up.

Conditions	mm ² /s (cSt)	SUS
Minimum	12	66
Continuous	20 - 80	98 - 370
Maximum	1500	6950

Table 14 Fluid viscosity limits

We recommend the use of an oil type having a viscosity of 35 mm²/s at the actual operating temperature.

Filtering

It is necessary to keep the level of oil contamination at an acceptable level to ensure problem-free operation. The recommended maximum level of contamination in systems in the hydraulic motor is 22/20/16 (ISO 4406-1999).

Chapter 4

Cross list

Topics:

- *OMS motor cross list*

OMS motor cross list

Shaft type	Cylindrical 32 mm (Conf. Code A1)		Splined 1.25 inch (Conf. Code A2)	
	Standard motor	ATEX certified	Standard motor	ATEX certified
Code number	151F0500	11159819	151F0507	11159828
	151F0501	11159820	151F0508	11159829
	151F0502	11159821	151F0509	11159830
	151F0503	11159822	151F0510	11159831
	151F0504	11159823	151F0511	11159832
	151F0505	11159824	151F0512	11159833
	151F0506	11159825	151F0513	11159834
	151F0605	11159826		
	151F0655	11159827		

Table 15 Mounting flange: Standard flange

Shaft type	Cylindrical 32mm (Conf. Code A3)	
	Standard motor	ATEX certified
Code number	151F0596 <i>(for technical specifications use 151F0500)</i>	11181957
	151F0597 <i>(for technical specifications use 151F0501)</i>	11184958
	151F0559 <i>(for technical specifications use 151F0502)</i>	11181959
	151F0569 <i>(for technical specifications use 151F0503)</i>	11181960
	151F0570 <i>(for technical specifications use 151F0504)</i>	11181961
	151F0571 <i>(for technical specifications use 151F0505)</i>	11181972
	11163772 - with viton shaft seal <i>(for technical specifications use 151F0502)</i>	11181943

Table 16 Mounting flange: Standard flange and coated bolt

Shaft type	No output shaft (Conf. Code D1)	
Code number	Standard motor	ATEX certified
	151F0535	11159837
	151F0536	11159838
	151F0537	11159839
	151F0538	11159840
	151F0539	11159841
	151F0540	11159842
	151F0541	11159843
	151F0608	11159844

Table 17 Mounting flange: Short

EU DECLARATION OF CONFORMITY

White Drive Motors and Steering Sp. z o.o.

Declare under our sole responsibility that the following product(s) / component(s)

Product category Orbital Hydraulic Motors
Type designation(s) OMS 80 – 500 and OMSS 80 – 400

Covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

Part number(s) / Serial number / date of manufactured:

Specifically identified on label affixed to product

European Directive: ATEX 2014/34/EU

International Standards EN ISO 80079-36 : 2016, EN ISO 80079:37 : 2016



White Drive Motors and Steering declares that the machine has been designed, constructed, and tested to fully comply with the health and safety requirements of the Directive, as mentioned above. Any modification to the machine without our prior permission renders this declaration null and void.

ATEX marking:

Motor type	Gas enviroment	Dust enviroment
OMS 80 - 500	Ex h IIB T5...T3 Gb	Ex h IIIC T115°C...T185°C Db
OMSS 80 - 400	Ex h IIB T5...T3 Gb	Ex h IIIC T85°C...T135°C Db

Technical dossier and archive:

Główny Instytut Górnictwa,
Jednostka Oceny Zgodności,
Zespół ds. Bezpieczeństwa Przeciwwybuchowego
43-190 Mikołów; ul. Podleska 72

Date:	Issued by	Date:	Approved by
01.10.2021	Marcin Ładziak	01.10.2021	Andrei Divissenko
 Head of Product Engineering		 Sales Director EU	

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