

HYTERA INDUSTRY REPORT

COMMUNICATING IN ATEX ENVIRONMENTS



Hytera 

Executive Summary

Throughout the world rising energy consumption is being driven by a continuing demand in developed nations, industrialisation in developing countries and by the desire of national governments to secure energy independence. And with many fields depleting, there is a real need to find new reserves of oil and gas.

This has prompted the industry to consider investigating more remote regions previously seen as economically unviable and difficult to explore, let alone extract and transport hydrocarbons.

The harsh environments found in areas like the freezing Arctic tundra, hot deserts or deepwater offshore sites provide major challenges for oil and gas companies, which have to overcome difficulties of being far from mainstream infrastructure and destination markets. The correct communication system is imperative to ensure your investment and assets are operating efficiently and your employees are safe and secure.

In this report we investigate some of the key areas that industry professional needs to take on board when specifying a two-way radio communication solution in the Oil and Gas industry.



Prioritising Safety

The oil and gas industry nurtures a very strong safety culture under even the most benign circumstances, but in these remote regions the operational, environmental and regulatory risk is that much higher. Companies need to instigate even more rigorous safety regimes to protect their infrastructure and to ensure the safety of their workers.

It is imperative that the equipment used in these remote regions is tough enough to withstand the conditions and reliable enough to ensure workers can do their jobs. Communication systems are no exception to this rule.

Ruggedised two-way professional mobile radio (PMR) systems, such as DMR and TETRA, are particularly suited to these harsh environments. They provide reliable and resilient communication tools for day-to-day operations and for responding to major incidents.

Even in much less environmentally hostile parts of the world, PMR systems provide an ideal solution for on-site communications at oil and gas facilities. This is because they are private wireless networks, which can be tailored to suit the individual requirements of any site in terms of coverage, capacity, network availability and security.



Intrinsically Safe

The oil and gas industry also requires the use of intrinsically safe (IS) communication devices due to the hazardous liquids and gases being handled.

Hytera offers certified intrinsically safe devices designed to prevent the radios from creating an ignition source in these potentially explosive environments.



Meeting The Standards

The standards for intrinsically safe radios and accessories are set in Europe by two EU ATEX (Appareils destinés à être utilisés en ATmosphères EXplosibles) directives, which describe what equipment and work environment is allowed in surroundings with an explosive atmosphere.

The other key standard is the IECEx (International Electrotechnical Commission Ex) system for certification to standards relating to equipment for use in explosive atmospheres.

When it comes to designing intrinsically safe radio terminals for use in the oil and gas industry (along with mining, airports, petrol stations and others) there are several key considerations that need to be met.


Devices must be able to cope with extreme temperatures ranging from +45°C to -20°C.

Devices also have to be resistant to sand, dust (including metal dust), oil/fuel, chemicals and water.

Devices need to be thoroughly tested for resistance to thermal shock (the ability to withstand sudden changes in temperature) and thermal cycling (the effects of alternating heat and cold) to ensure their reliability.

The equipment also needs to be rugged enough to withstand hits and drops. High levels of IP and MILSTD (military standard) protection are therefore necessary.





Hytera deliver crystal clear audio further enhanced by a range of intrinsically safe accessories.

Audio Performance

Audio quality is another important factor. Oil and gas facilities are noisy environments, not to mention the additional noise created by weather factors such as high winds and seas.

Boosting audio levels to overcome these louder environments is tricky. The usual way to achieve louder audio is to insert a larger speaker into the radio and push more current to it. However, the ATEX standards place restrictions on the level of current to the speaker to help prevent the radio becoming a source of ignition.

Hytera intrinsically safe devices use the latest in advanced audio processing technology to overcome this design challenge and deliver clear audio to the user, further enhanced by a range of intrinsically safe audio accessories.



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Ease of Use & Accessories

Consideration also has to be given to the basic radio design to make it easy to use in the field. The radio control dials, knobs and buttons are designed to be used with gloves or for people with restricted vision when wearing safety goggles or even respirator face masks.

Hytera radios are designed to work with a wide range of accessories to suit different types of jobs within the oil and gas sector, as well as other IS industries. Accessories include large PTT (push-to-talk) buttons, high-attenuation headsets and throat or skull microphones. All are tested as complete systems to ensure safety is not compromised.

Due to the harsh environment and continued use of equipment for shift after shift, consideration needs to be given to the quality and reliability of the component parts. Rigorous military standard environmental and stress testing ensures handsets continue to perform, whilst IP ratings and drop tests certify that devices are adequately manufactured to protect against ingress and knocks or drops.



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- 1 Atex High-attenuation Headset with remote speaker microphone **ECN20-Ex**
- 2 Atex throat-microphone with remote speaker microphone **ELN09-Ex**
- 3 Atex High-attenuation Headset **POA62-Ex**
- 4 Remote Speaker Microphone (dual PTT Button) **SM24N1-Ex**

The Advantages of PMR ATEX Networks

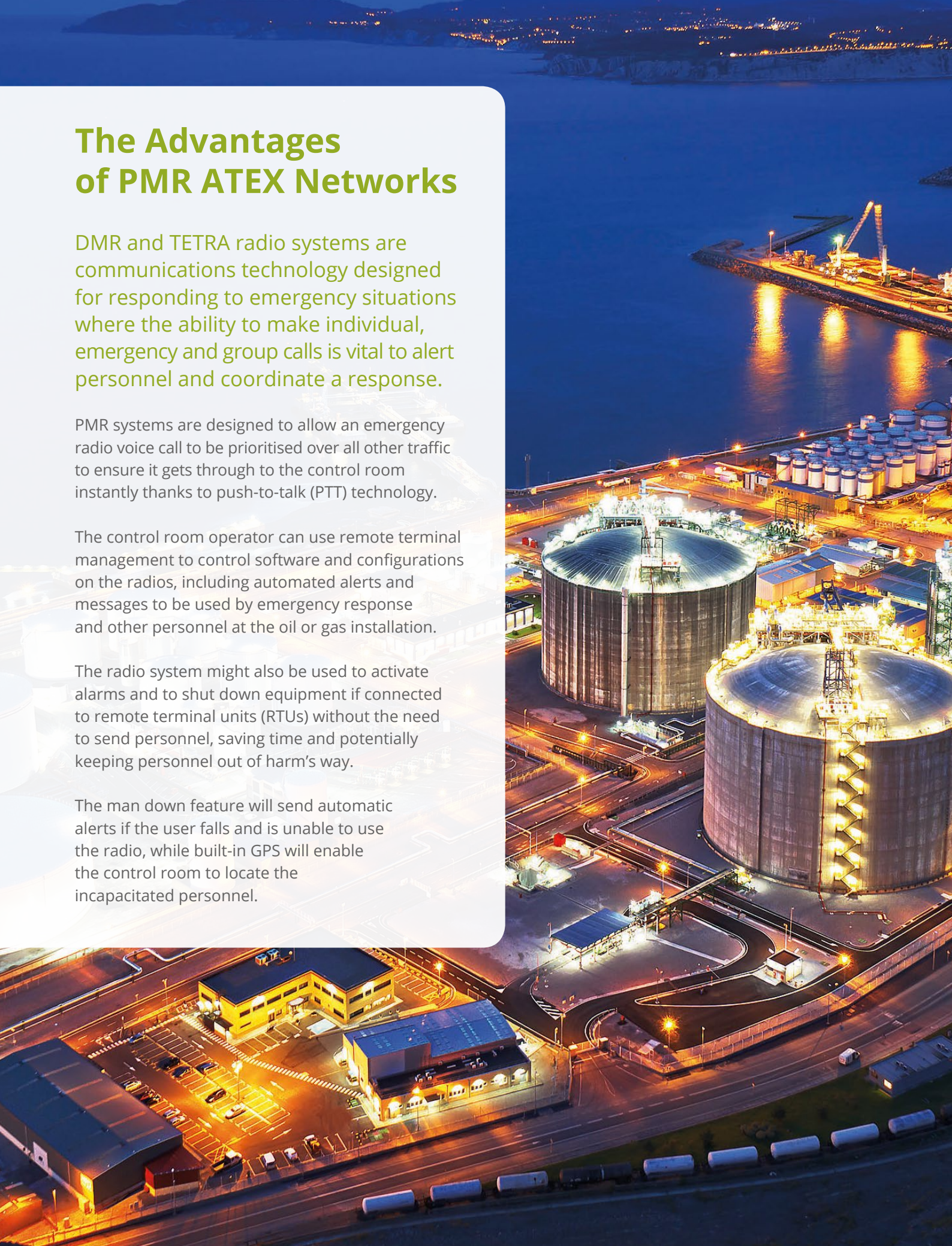
DMR and TETRA radio systems are communications technology designed for responding to emergency situations where the ability to make individual, emergency and group calls is vital to alert personnel and coordinate a response.

PMR systems are designed to allow an emergency radio voice call to be prioritised over all other traffic to ensure it gets through to the control room instantly thanks to push-to-talk (PTT) technology.

The control room operator can use remote terminal management to control software and configurations on the radios, including automated alerts and messages to be used by emergency response and other personnel at the oil or gas installation.

The radio system might also be used to activate alarms and to shut down equipment if connected to remote terminal units (RTUs) without the need to send personnel, saving time and potentially keeping personnel out of harm's way.

The man down feature will send automatic alerts if the user falls and is unable to use the radio, while built-in GPS will enable the control room to locate the incapacitated personnel.



PMR as part of a unified network

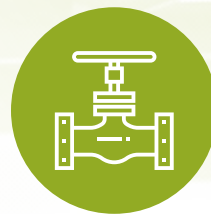
It is also worth noting that PMR networks can become part of a wider unified communication network connecting the oil and gas installation with marine vessels, aircraft and onshore control rooms using a Hytera unifying platform. This aids coordination and avoids potential confusion caused by the use of separate communication systems.

The backbone of PMR networks can be used to connect RTUs to collect and send back SCADA (supervisory control and data acquisition) information. They can also be used to control and automate field production processes and parameters, including flow, pressure, vibration and temperature, in remote locations from a single central point.

A whole range of infrastructure can be monitored and controlled without the need for human intervention, including: wellhead monitoring and control; gas field control and monitoring; drill rig power management and monitoring; drill rig internal communications; and pipeline and storage tank telemetry.

Modern digital, IP-based PMR systems such as DMR and TETRA can carry a lot of this data; other remote applications such as video surveillance intrusion detection will require broadband technology such as 3G, 4G LTE, WiMAX or WLAN.

Monitoring Infrastructure with PMR



Wellhead monitoring and control



Drill rig power management



Gas field monitoring and control



Drill rig internal communications



Pipeline & Storage tank telemetry

Hytera ATEX Radios

Hytera is ideally placed to provide oil and gas companies with two-way ATEX radio solutions, as it has both DMR and TETRA solutions in its portfolio, which meet ATEX, IECEx and FM certifications.



The company offers four **DMR** ATEX handheld radios: the **PD715EX** (ib) and **PD715IS** (ia) both without keypad or display screen; and the **PD795Ex** (ib) and **PD795IS** (ia) offering a full keypad and 1.8-inch display screen. It also offers the **PT790Ex** (ia) **TETRA** ATEX handheld radio. The radios are MILSTD-810 C/D/E/F/G and IP 67 rated for dust and water protection.





The Only 'ia' Certified Radios

The Hytera PD715IS and PD795IS terminals are the first DMR handsets in the world to achieve 'ia' classification, the strictest level of intrinsically safe protection available, whilst the PT790Ex was the first TETRA device to achieve 'ia' standard.

The 'ia' certification means the radio circuit has three protective measures, allowing for the occurrence of two faults during operation without risking user safety. This means it can be used in Intrinsically Safe Zones 0, 1 and 2 areas. Other ATEX radios are 'ib' certified for use in Intrinsically Safe Zones 1 and 2 areas only.

Zone 0 (or 20) is defined as: an area with very high levels of hazardous product present continuously; Zone 1 (or 21) as one with high levels present intermittently; and Zone 2 (or 22) as one with normal levels present abnormally.

The 'ia' certification is a demanding one to meet, but Hytera has become the first, and so far only, PMR manufacturer to produce ATEX radios to this toughest of standards. The PD715IS and PD795IS DMR radios meet the following IS certifications: Ex ia IIC T3Ga; Ex ia IIIC T160C; and Ex ia I.



Explosive Gas Mixture Presence

ZONE 0

Continuously present for long periods



ZONE 1

Likely to occur in normal operation



ZONE 2

Unlikely to occur in normal operation



New Design Features

One of the keys to achieving these certifications is the innovative use of silicone encapsulation technology to provide triple protection of the internal circuits to ensure they are not exposed to intrusion by liquid, inflammable dust or explosive gas.

Hytera has implemented a strict PCB (printed circuit board) design whereby all key components are covered with a shield to minimise the circuit fault probability. The radios also feature a higher EMC (electromagnetic compatibility) performance than previous models.

The light shell of the ATEX radios uses a patented dual-material moulding technology designed to reduce the possibility of static discharge from the radio. The rear part of the terminal battery and both sides of the shell feature a skid-proof design to prevent dropping and ensure easy grab.



Silicone Encapsulation Technology



Printed Circuit Board Design



High Electromagnetic Compatibility



Skid Proof & Lightweight Shell



Display screen & keypad

The PD795IS radio has a 1.8-inch colour LCD display screen made of tough, crack-proof, antistatic material. The screen is viewable even in bright sunlight and features an easy to use menu with up to 20 programmable keys.

The compact and large textured keys provide for excellent tactile feeling and make the radio easy to use with gloves or in the dark. A dedicated orange emergency button is also mounted on top of the radio.



Control knobs & antenna

The radios feature Hytera's standard rotary volume knob and channel selection knob (different sizes to aid operation) mounted on top of the radio and separated by the antenna to make each easier to identify and control.

The centrally mounted antenna has an omnidirectional pattern to provide better coverage and comes with built in GPS as standard.

New anti-spark battery latch design

Hytera has also come up with a new, patented battery latch design. To disengage the battery from the radio the user has to move the lock and bolt of the latch along two different axes. This design ensures the battery does not fall while being disengaged, avoiding a drop that might cause a spark.

Finally, to minimise the possibility of a discharge at the belt clip, the screws for fastening the belt clip are countersunk. If the radio should ever be dropped, the screws will not touch the ground.

When it comes to providing tough, reliable and intrinsically safe two-way radios for the oil and gas industry Hytera has the best solution for any hazardous environment.

Battery life

The radios use an 1800mAh large capacity Li-ion battery, which can last more than 20 hours under 5-5-90 duty cycle. Strict overcharge and over-discharge protection protects the battery against instability caused by overheating. In addition, the battery cells are also encapsulated to redistribute single point heat build up and prevent air discharge as well.



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