

TAKING SAFETY FURTHER

DIESEL ENGINES AND EQUIPMENT FOR HAZARDOUS AREAS



CAT EXPLOSION PROTECTION



SAFEGUARD BUSINESS AS USUAL

INTRODUCING CAT EXPLOSION PROTECTION

In 2011 Caterpillar Inc. acquired the Pyroban Group, a proven provider of safety solutions to potentially explosive hazardous areas in the oil and gas industry. With more than 40 years experience Pyroban have represented leading explosion protection for a long time.

Now Caterpillar takes this position further, making this an integrated part of our complete offer. When the job takes you into a hazardous location, Caterpillar Explosion Protection has the right products. Our HazPak engine packages, Up-Fit Kits and range of Ex components fulfill industry standards, enhancing the safety of your operations.



THE SCIENCE OF EXPLOSIONS





There is always a risk of a flammable hydrocarbon release in the oil and gas industry. When the release comes into contact with air and an ignition source, an explosion can happen.

Cat Ex solutions are designed to reduce the risk of an engine being the source of ignition.

Potential ignition sources on unprotected diesel engines include electrical, mechanical or static sparks, overspeed or flame transmission from inlet or exhaust, and hot surfaces.

Flammable gases in the atmosphere can be drawn in through the air intake along with air for combustion. This can result in flashbacks through the inlet and backfires in the exhaust.

If the engine consumes flammable gas mixed with air and diesel fuel, engine overspeed can occur, which can lead to the engine running out of control. This can result in catastrophic failure of the engine, creating unprotected ignition sources.

Another risk is engine misfiring, leading to unburnt fuel mixture entering the exhaust system. This can be detonated from the heat of the exhaust and ignite the surrounding atmosphere.

Various surfaces on a diesel engine can exceed safe limits and become sources of ignition. These surfaces need to be protected to avoid the danger of explosion.

MAKING A DIFFERENCE THROUGH ENGINEERING EXCELLENCE

With more than 40 years of experience delivering complex hazardous area engineering solutions, Caterpillar Explosion Protection delivers high quality safety products, tested and documented to latest industry standards worldwide.





Cat HazPak engines are designed, manufactured and tested by Caterpillar in Caterpillar factories for single-source package confidence.

CERTIFICATION AND TESTING

All Cat® HazPak engines are certified, where applicable, to ATEX 2014/34/EU (94/9/EC) and NEC 505 / NEC 500. In addition, they are manufactured in accordance to ISO9001:2008 quality standard certification, driving a Zero-Defect Culture

With in-house test facility procedures and approval to national standards, Caterpillar ensures quality at every step in the process

LEGAL COMPLIANCE

Regional legislation governs health and safety issues related to explosion protection of electrical equipment worldwide.

However, since mechanical equipment is not always regulated, there is a significant potential risk to people, the environment, and your investment. Be aware of the risks and choose additional discretionary safety.



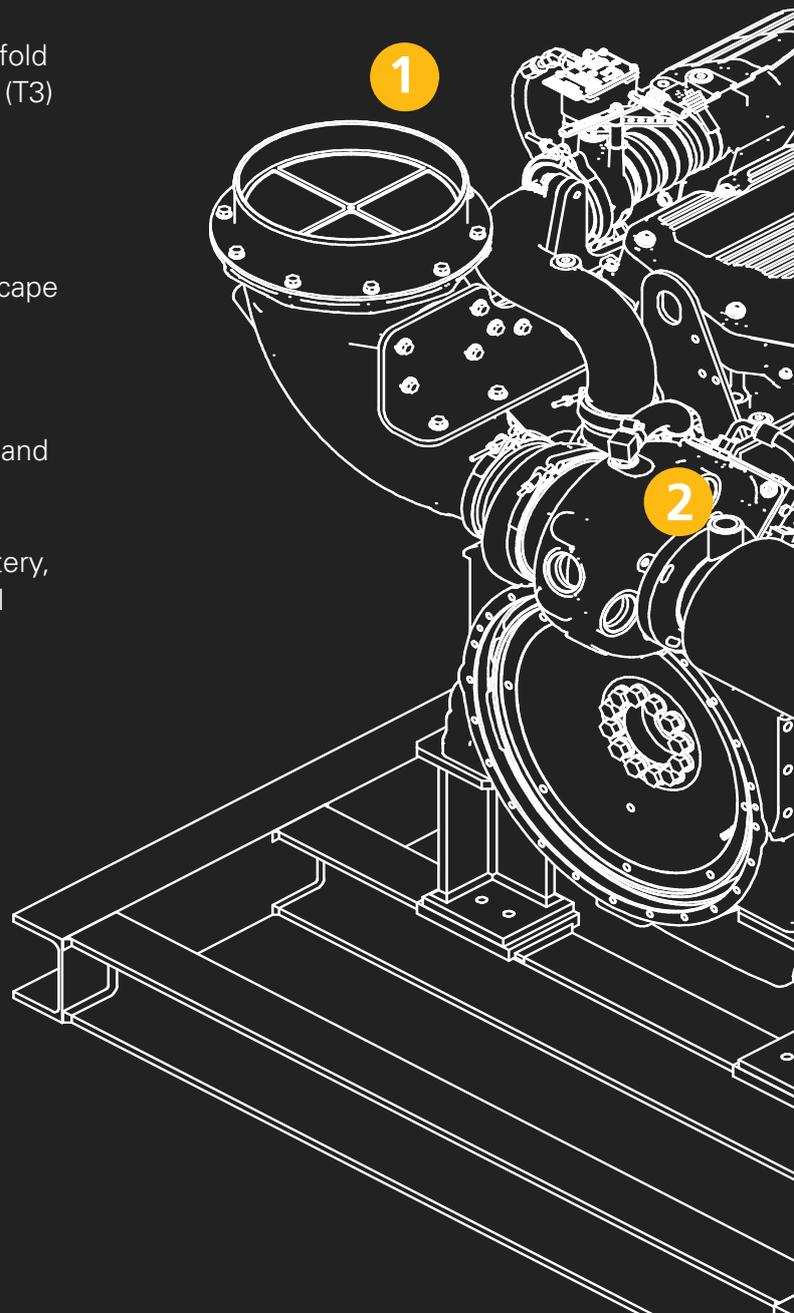
HAZPAK – UNIQUE ENGINE DESIGNS

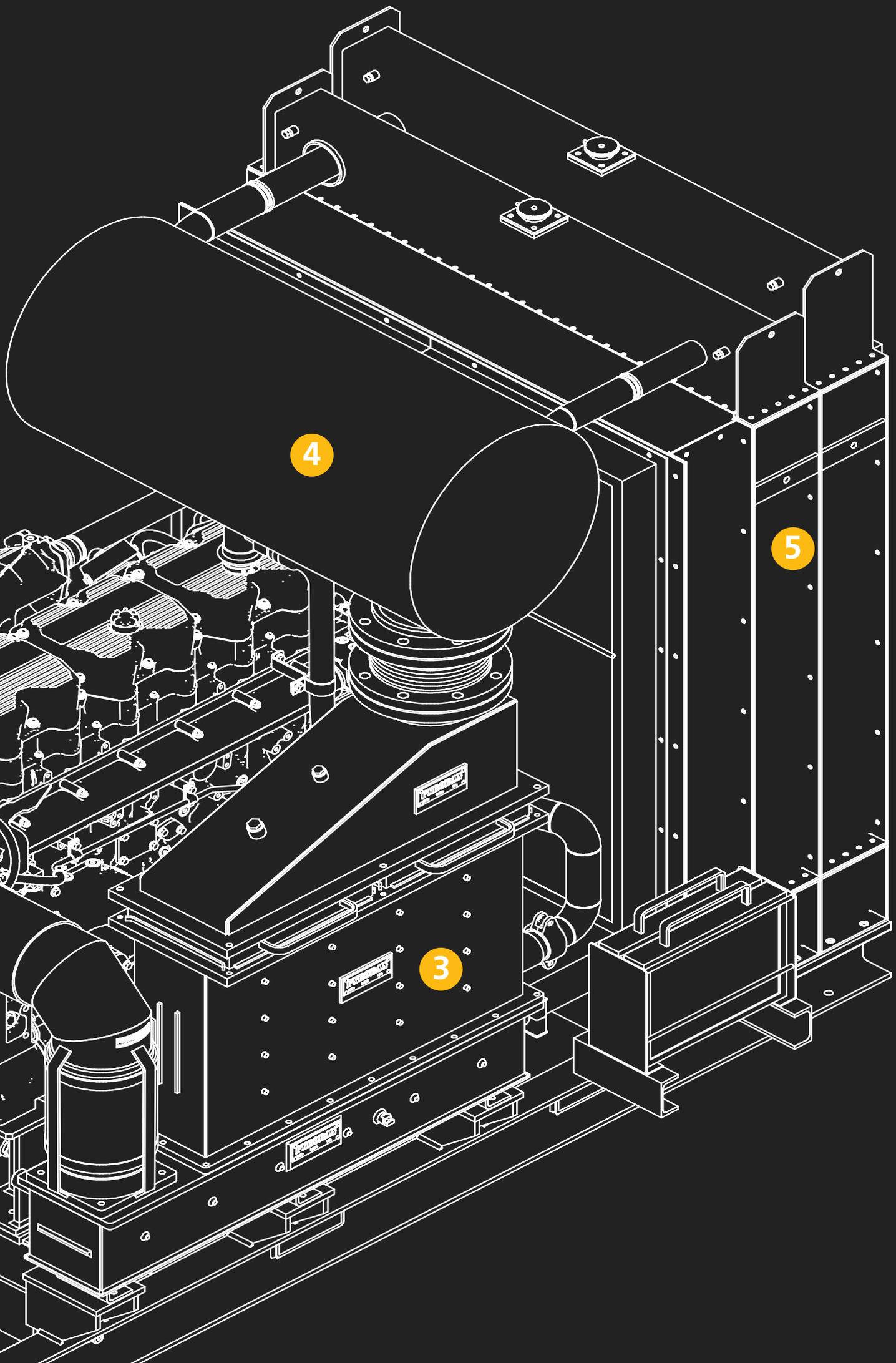
Combining Pyroban technologies with Caterpillar manufacturing processes at the Shoreham-by-Sea factory in the UK, Caterpillar now has an ideal purpose-built explosion protected range.

All Cat explosion protected products include specific features designed to prevent ignition sources causing an explosion in the event of a hydrocarbon release.

- 1** Cat Ex ASO Valve
Air shut-off and inlet flame arrestor
- 2** Water-cooled Turbocharger and Exhaust Manifold
Ensures surface temperature is below 200oC (T3)
- 3** Exhaust Gas Heat Exchanger
Cools the engine exhaust below 200oC (T3)
- 4** Spark Arrestor
Ensures that no exhaust-born hot particles escape into the atmosphere
- 5** Radiator
A choice of industrial or marine solder dipped radiators providing additional cooling capacity and corrosion resistance is available

Explosion protection also includes Cat Ex Battery, charge air system, Cat Ex SCS (Safety Control System), as well as certified ECM and engine electrical system.





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PURPOSE-BUILT EX POWER SYSTEMS

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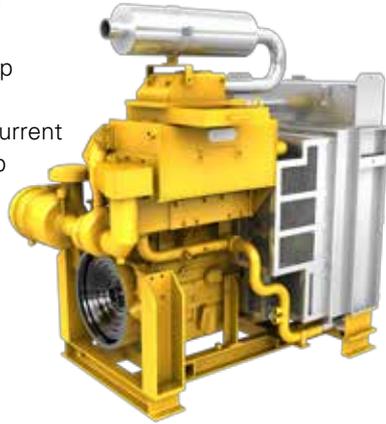
CAT EXPLOSION PROTECTION FEATURES

- **CAT HAZPAK** Explosion protected, radiator to flywheel, diesel engine package
- **CAT EX UPFIT KIT** Kit of explosion protection safety components for a diesel or gas engine
- **CAT EX SCS** Explosion protection safety control system
- **CAT EX ALTERNATOR** (Battery Charging) Explosion protection 12V & 24V alternator
- **CAT EX ALTERNATOR** (Power) Explosion protection 60kVA & 80 kVA power generation alternators
- **CAT EX SIT** Twin wall insulated exhaust system
- **CAT EX ASO VALVE** Explosion protection air shut off valve
- **CAT EX BATTERY** Explosion protection 12V and 24V battery packs

CAT HAZPAK ENGINES

C4.4 TA* HAZPAK

CCNR Stage 2, EPA T2 M
96kW / 128bhp
1500rpm
112kW / 150bhp
1800rpm
Emissions non-current
92 kW / 123bhp
2200rpm



C4.4 NA* HAZPAK

CCNR Stage 2, EPA T2 M
45kW / 60bhp 1500rpm
44kW / 59bhp 1800rpm
Non-current EU II
52 kW / 70bhp
2200rpm



C7 HAZPAK

IMO II, EPA T2 M, EPA
T3 NR
158 kW / 211bhp
2200rpm



C9 HAZPAK

EPA and CARB T3 NR, EU
IIIA NR, EPA T2 M, IMO II
227 kW / 304 bhp
2200rpm



3406C HAZPAK

Emissions
non-current
336 kW / 451 bhp
2100rpm



C15 HAZPAK

IMO II, EPA T3 M, EU IIIA
NR 376 kW / 504 bhp
1800-2100rpm



* C4.4 NA and C4.4 TA are supplied with a fitted spark arrester. All other engines are visual representations of the engine packages with a standard spark arrester to be fitted on delivery. For more information, please contact your Cat dealer representative. Power rating shown are Net inclusive of fan losses

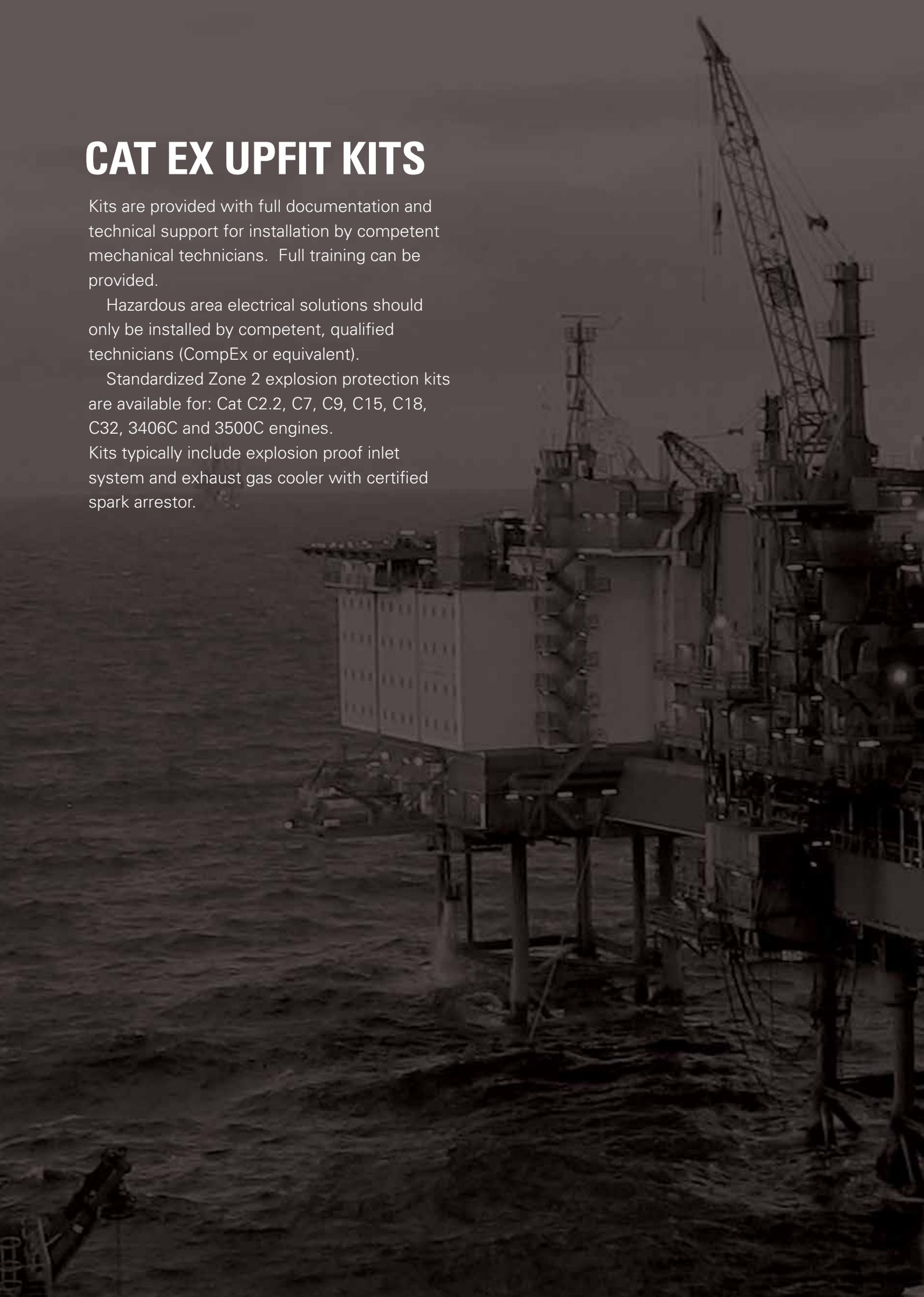
CAT EX UPFIT KITS

Kits are provided with full documentation and technical support for installation by competent mechanical technicians. Full training can be provided.

Hazardous area electrical solutions should only be installed by competent, qualified technicians (CompEx or equivalent).

Standardized Zone 2 explosion protection kits are available for: Cat C2.2, C7, C9, C15, C18, C32, 3406C and 3500C engines.

Kits typically include explosion proof inlet system and exhaust gas cooler with certified spark arrestor.



CAT EX COMPONENTS



CAT EX ALTERNATORS (BATTERY CHARGING)

The battery charging flameproof alternator (FPA) range is designed for operation in classified hazardous area conditions



CAT EX ALTERNATOR (POWER)

The AC alternator is a brushless, fully enclosed, fan-cooled, non sparking, twin bearing AC alternator with an output of 60kVA or 80kVA.



CAT EX BATTERY

Non sparking offshore battery with flameproof isolator and terminal box are designed for use in hazardous areas and are corrosion resistant with a 316 stainless casing. The 12V and 24V units contain deep cycle batteries protected with a 50A MCB isolator.



CAT EX ASO VALVE

The ASO Valve is a series of inlet shut-off valves - a key safety component for diesel engines. The valves can include integral flame arrestor elements. Its primary use is to stop engine overspeed, but can also be used in the event of exhaust and coolant over-temperature or low oil pressure

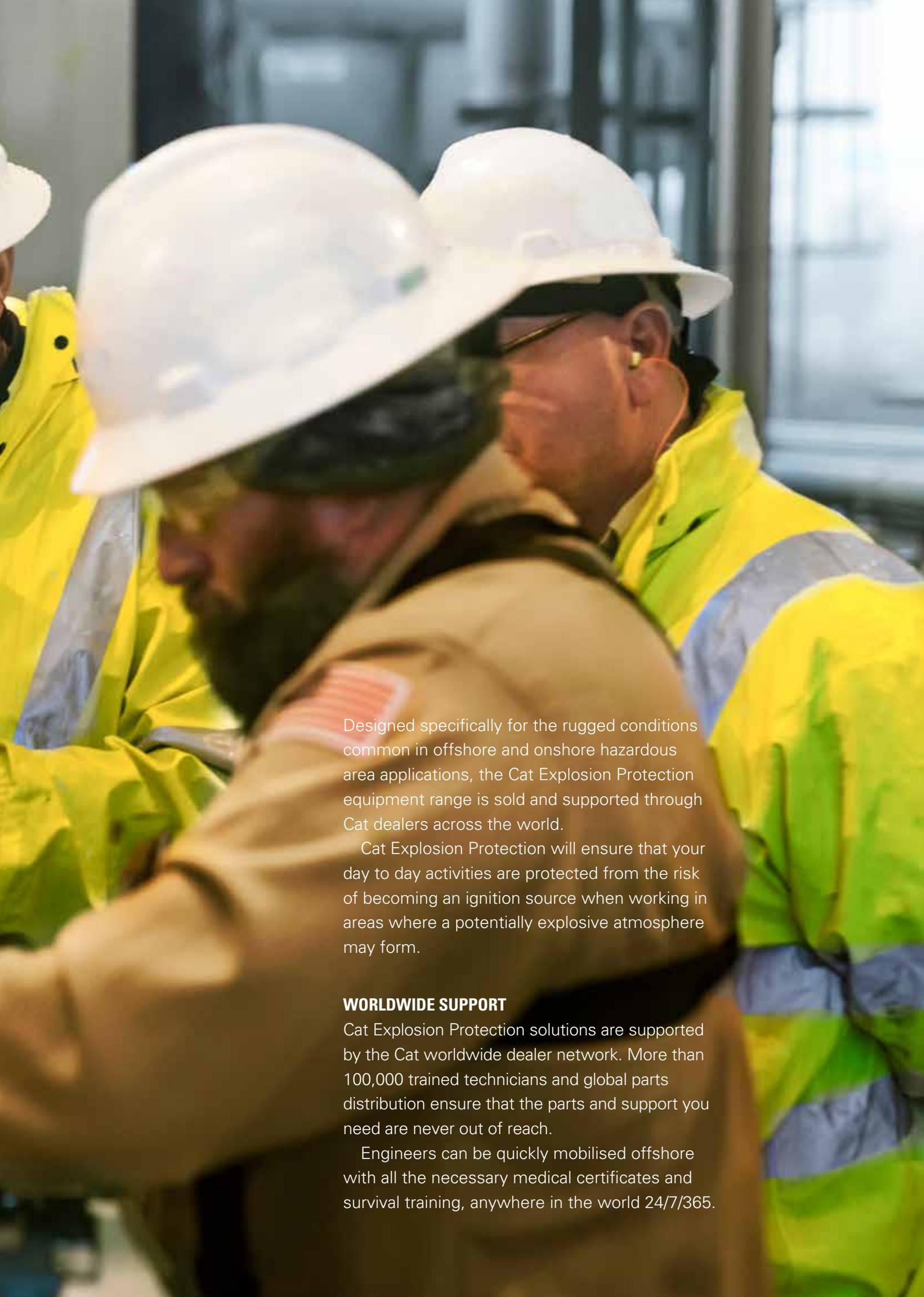


CAT EX SIT

A revolutionary double skin exhaust duct which allows the safe ducting of hot exhaust gases from an engine without the need for exhaust gas cooling. Can be deployed as part of an Added Safety risk management system. Cat Ex SIT can be deployed in ATEX classified Zone 2 areas but additional protection is required for the engine air inlet - contact your dealer for information on Zone 2 deployment.

ENGINEERS QUICKLY MOBILISED OFFSHORE





Designed specifically for the rugged conditions common in offshore and onshore hazardous area applications, the Cat Explosion Protection equipment range is sold and supported through Cat dealers across the world.

Cat Explosion Protection will ensure that your day to day activities are protected from the risk of becoming an ignition source when working in areas where a potentially explosive atmosphere may form.

WORLDWIDE SUPPORT

Cat Explosion Protection solutions are supported by the Cat worldwide dealer network. More than 100,000 trained technicians and global parts distribution ensure that the parts and support you need are never out of reach.

Engineers can be quickly mobilised offshore with all the necessary medical certificates and survival training, anywhere in the world 24/7/365.

PROTECTING YOU AND YOUR INVESTMENT

Built around Pyroban's 40 year legacy, Cat Explosion Protection provides innovative solutions to a challenging and ever-evolving industry. Cat Ex Haz Paks, Up-Fit Kits and Components are built to provide the protection you need when operating in potentially explosive atmospheres.

Backed by the Cat dealer network – at hand where and when you need them – you can rely on Caterpillar products to support your enduring success.

BUILT FOR IT™

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