

GE MINING BULLETIN 35504: C9 Engine System intrinsically safe Connections

Prepared For: Industry

Prepared By: Mike Kelly

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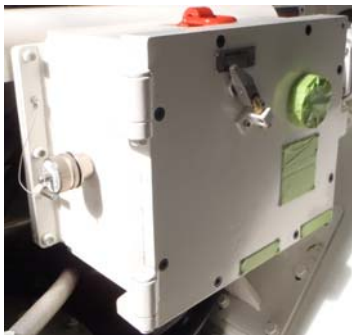
GE Industrea Emerald
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Background

Pursuant to the Safety Alert, SA17-06 – “Flameproof alternators supplying intrinsically safe equipment,” issued by the NSW Department of Planning & Environment on the 9th of June 2017, machines fitted with flameproof alternators supplying intrinsically safe equipment should be assessed in accordance with AS/NZS 60079.25:2011.

During the process of the assessments conducted in response to the alert mentioned above, a concern was brought to the attention of GE Mining in respect of a potential safety and/or compliance issue which relates to the C9 engine control system. The concern relates to intrinsically safe (I.S.) cables that run from the main flameproof (FLP) enclosure which houses the engine electronics system and which go out to an intrinsically safe (i.e. non-flameproof) junction box.



Early style FLP without Amphenol connectors



Later style FLP enclosure with Amphenol connectors



I.S. junction box, often mounted directly behind the FLP enclosure

Communication

The GE Mining machines that use the C9 engine system should be inspected to ensure the Alternator 0V is not connected to the screens of any I.S. cables leaving the engine control flameproof enclosure. Later C9 builds are fitted with an Amphenol plug and sockets for intrinsically safe cable entry to the main enclosure and earlier builds have the cables glanded at the main FLP enclosure.

It is recommended that for the affected machines, the inspections described in this bulletin be carried out by suitably qualified personnel as part of the assessments required by Safety Alert SA17-06: "Flameproof alternators supplying intrinsically safe equipment". with the results recorded.

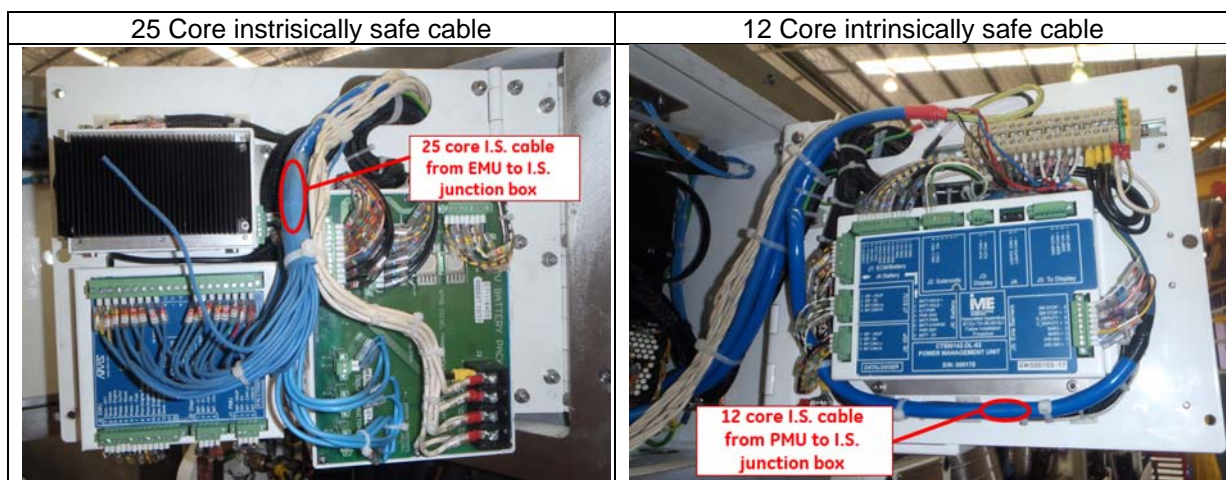
A list of all machines installed with a C9 engine system is provided in Appendix A
This does not affect any machines without the C9 engine, i.e. those which use the 3126 engine



1 Machine Inspection

There are two intrinsically safe cables that run from the main flameproof enclosure to the I.S. junction box and both are screened. Later versions of the engine control circuit depict the screens of these cables connected to Alternator 0V rather than chassis earth. This presents two potential issues:

1. AS/NZS 60079 & AS 4871 require all non-intrinsically safe circuits to be terminated in an explosion proof enclosure, Ex'd' (the I.S. junction box is not Ex'd').
2. AS/NZS 60079.25-2011, Intrinsically safe electrical systems, clause 8 contains the following directive:
"A multi-core cable containing circuits classified as level of protection "ia", "ib" or "ic" shall not contain non-intrinsically safe circuits."



No connection between any conductor in an I.S. cable and a non I.S. circuit is permissible.



WARNING

Action required: GE Mining recommends that all C9 engine system powered machines be subject to the following inspections while in an isolated, immobilized state in accordance with approved procedures, in a non-hazardous area.



1.1 Inspection, (with or without Amphenol connectors fitted)

Note that earlier versions of the system had the two cables concerned exiting the flameproof enclosure through glands, without connectors.

Perform a continuity test between all conductors and screen of the two I.S. cables and Alternator 0V to ensure no continuity is present. Using a multimeter or ohm meter, confirm that all read above 2M ohms. Any that do not, must be rectified.

Note that actual resistance measured will vary according to which alternator is fitted to the machine. The only two alternator types known to be fitted to GE Mining C9 powered machines are the MR111 series and the MAE 4X unit. Alternator 0V to Chassis ground resistance quoted by manufacturers are:

PPK/Mining Repairs MR111	MAE 4X
Alt. 0V to chassis ground ohms = 1.8M ohms	Alt. 0V to chassis ground ohms = 10.2k ohms

If another type of alternator has been fitted, the disconnected 0V – ground resistance should be measured before this test as a reference.

1.2 Amphenol Plug & Socket

Note unused connector pins. One spare contact should be present in the 26 Pin Amphenol connector, (i.e. not used for Alternator 0V connection).

2 Modification if Required

If the Alternator 0V is not connected to any of the conductors, (including screen) within either the 12 core or the 25 core I.S. cables, no modification is required.

Following inspection, add a note to the machine safety file confirming the test specified in this bulletin has been passed and promptly advise GE Mining of the outcome of inspection and detail of any modifications required.

2.1 Glanded

If the screens of the I.S. cables are connected to the Alternator 0V, then the screen must be disconnected from the Alternator 0V and connected to earth.

Note that all I.S. cable screens must be connected to chassis earth at one end only.

2.2 Amphenol Plug & Socket

If a wire from one of the pins on the Amphenol socket is connected to Alternator 0V, then the wire running from Alternator 0V to the pin of the socket needs to be disconnected from Alternator 0V and connected to earth.

Note that all I.S. cable screens must be connected to chassis earth at one end only.



3 Outcome

1. No connection to any non I.S. circuit may remain present in either the 12 core or the 25 core I.S. cable.
2. The Amphenol socket (where fitted) on the FLP enclosure cannot have the Alternator 0V connected to any of its pins.
3. The cable from the I.S. junction box must have its screen connected to chassis earth whether it is glanded or through the Amphenol plug and socket.
4. All I.S. cable screens must be earthed at one end only.
5. Promptly advise GE Mining of test results, identifying specific machine by build number, machine owner and rectifications applied. Add a note to the safety file of the machine.

Please distribute this bulletin to all relevant personnel

GE Mining contacts in respect to this bulletin:

Product Support Engineer William.davidson1@ge.com	Bill Davidson	0409562385
Field Service Leader Dayle.tulip@ge.com	Dayle Tulip	0457999800
Operations Manager Kurt.Hartwell@ge.com	Kurt Hartwell	0429995155

4 Appendix A – Machine listing

LWC (LongWall Carrier)
 LSC (LongWall Shearer Carrier)
 CoaLHD (Coal Haul Dump)

4.1 Australia

Type	S.N.	Status
LWC	57	
LWC	58	
LWC	144	
LWC	145	
LWC	151	
LWC	152	
LWC	157	
LWC	158	
LWC	190	
LWC	191	
LWC	192	
LWC	193	
LWC	194	
LWC	195	
LWC	196	
LWC	207	
LWC	208	
LWC	219	
Dozer	6	
Dozer	7	
Dozer	9	
LSC	12	
LSC	13	Inspected 18/07/2017
LSC	14	
LSC	15	
CoaLHD	1	
Flitmate	5	

4.2 China

Type	S.N.	Status
LWC	82	
LWC	83	
LWC	84	
LWC	91	
LWC	92	
LWC	93	
LWC	94	
LWC	95	
LWC	96	
LWC	97	
LWC	98	
LWC	99	
LWC	100	
LWC	101	
LWC	102	
LWC	103	
LWC	104	
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LWC	125	
LWC	126	
LWC	153	
LWC	154	
LWC	155	
LWC	156	
LWC	166	
LWC	167	
LWC	169	
LWC	209	
LWC	210	
LWC	211	
LWC	212	
LWC	213	
LWC	214	
LSC	11	