



MHSC

Mine Health and Safety Council

EXPLOSIVES REGULATIONS

Amendment Note - 2019

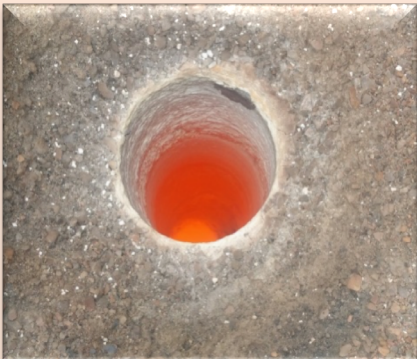
Introduction

The Minister of Mineral Resources amended the Explosives Regulations, as found in Chapter 4 of the Mine Health and Safety Act, by notice in the South African Government Gazette on the 14th of September 2018.

The previous explosives legislation promulgated by Government Notice No. 38970 dated the 10 July 2015 dealt with the risks and hazards associated with more sensitive Nitroglycerin based explosives and open flame initiation systems in comparison to today's less sensitive Ammonium Nitrate - based explosives and closed flame initiation systems. Accordingly, the broad variety of explosives and methods of initiation have different requirements which varies from mine to mine as it is determined by the explosives supplier/ manufacturer's recommendations from time to time based on the blast design. The amended regulations as promulgated by Government Notice No. 41904 dated 14 September 2018 deal with the following aspects:

1. Definitions relating to explosives;
2. Destruction of explosives;
3. Precautionary measures before initiating explosive charges;
4. Precautionary measures for misfires, sockets and old explosives;
5. Precautionary measures for marking, drilling and blasting;
6. Precautionary measures for stemming and tamping of shot holes;
7. Blasting within 500m of any structure;
8. Insertion of more than one detonator into an explosive charge; and
9. Definition of Competent person

Definition Amendment

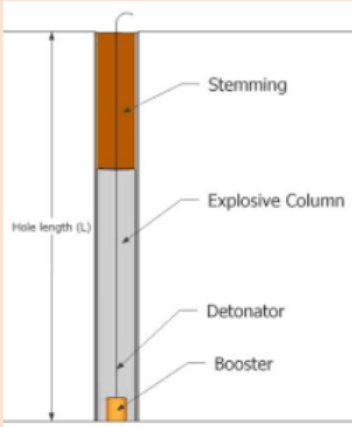
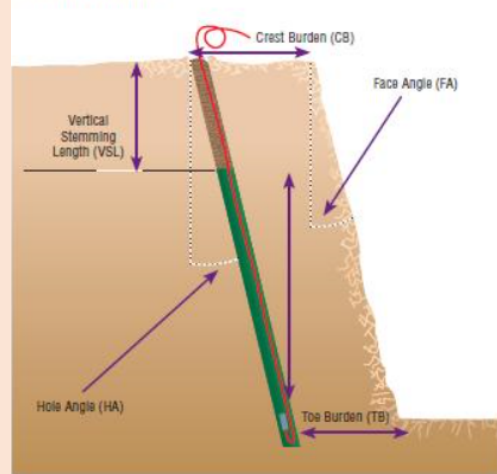
Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
"hot holes" means shot holes which after being drilled has an ambient temperature increase of 3 degrees Celsius  Figure 1: Example of "Hot Hole"	"hot holes" means shot holes, in a coal mine, which after being drilled has an in-hole ambient temperature of 40 degrees Celsius or above, or an increase of 3 degrees Celsius or more	<i>The definition is now more specific to coal mining operations. When old coal workings are exposed to the atmosphere and water for a prolonged time during the opencast mining phase, spontaneous combustion of the coal in the old workings occurs and spread into overburden rocks and strata as well.</i> <i>Surface coal mining operations have a greater risk of experiencing hot holes, where temperatures of the hot holes need to be measured throughout the length of the shot hole and recorded prior and during charging up operations.</i>

Destruction of Explosives

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.2(3)(v) No person destroys explosives on surface within a horizontal distance of 150m of any public building, public thoroughfare, railway line, power line or any place where people congregate or any other structure, which it may be necessary to protect in order to prevent any significant risk, unless: a) A risk assessment has identified a lesser safe distance and any restrictions and conditions to be complied with; b) A copy of the risk assessment, restrictions and conditions contemplated in paragraph (a) have been provided for approval to the Principal Inspector of Mines (PIoM); c) Written permission has been granted by the PIoM; and d) Any restrictions and conditions determined by the PIoM are complied with	4.2(3)(iv) No person destroys explosives on surface within a horizontal distance of 150 metres of any public building, public thoroughfare, railway line, power line or any place where people congregate or any other structure, which it may be necessary to protect in order to prevent any significant risk, unless: a) a risk assessment has identified a lesser safe distance and any restrictions and conditions to be complied with; b) a written application accompanied by the following documents is submitted to the Principal Inspector of Mines for approval- i. <u>a sketch plan indicating the distance from the explosives' destruction area to the affected structures;</u> ii. <u>a risk assessment;</u> iii. <u>proof of consultation with the owners of the affected structures; and</u> iv. <u>restrictions and conditions.</u> c) a written approval has been granted by the Principal Inspector of Mines; and	<i>The new regulations require any person intending to destroy explosives within a horizontal distance of 150m of any public structure to provide the PIoM with (i) a sketch plan indicating the distance from the explosives destruction area to the affected structures, and (ii) proof of consultation with the owners of the affected structures.</i> <i>This is in addition to providing a risk assessment, and complying with any restrictions and conditions as determined by the PIoM</i>

	d) any restrictions and conditions determined by the Principal Inspector of Mines are complied with.	
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Precautionary measures before initiating explosives charges

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.6(1)(c) The employer of every underground coal mine must take reasonable measures to ensure that the competent person referred to in regulation 4.4(1) does not initiate explosive charges in an underground coal mine unless the portion of the shot hole between the explosive charge and the collar is completely filled with stemming and tamped, in accordance with regulation 4.14. 4.14(1) Tamping of each shot hole is of a minimum length of 0.4m or a third of the length of the shot hole, whichever is greater, to a maximum length equal to the burden used in the blast pattern.  Figure 3: Length of stemming diagram 1	4.6(3)(b) The employer at any underground mine must take reasonable measures to ensure that the competent person referred to in regulation 4.4(1) does not initiate any explosive charge unless the portion of the shot hole between the explosive charge and the collar of the shot hole is stemmed and tamped in accordance with the requirements of regulation 4.14. 4.14(2) the length of stemming and tamping of a portion of a shot hole between the explosive charge and the collar of a shot hole is determined by means of a risk assessment conducted by the employer in consultation with the explosives manufacturer or supplier, stemming manufacturer or supplier and the competent person contemplated in regulation 14.1 (8). The risk assessment must consider at least the following: - coupling ratio of explosives; - energy released to protect in situ rock; - containment of fly rock and air blast; - blast design and type of explosives; - geology and type of rock; and - safety in dealing with misfired holes.	For underground coal mines, previous regulations suggested that the length of tamping needs to be a minimum of 0.4m or a third of the length of the shot hole, whichever is greater, to a maximum length equal to the length of the burden used in the blast pattern. For any underground mine (including coal mines) Current regulations allow for a risk assessment process to be done by the employer in consultation with OEM, Supplier, and Competent Person appointed in terms of 14.1(8) (Rock Engineer).  Figure 4: length of stemming diagram 2

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.6(3)(a) The employer of every underground mine must take reasonable measures to ensure that: a) explosives are not brought to the working face where blasting is to be carried out unless the- i. drilling of shot holes has been completed; ii. shot holes are ready to be charged with explosives; iii. quantity of explosives do not exceed the estimated required quantity to be used for the blast;	4.6(3)(a) The employer at any underground mine must take reasonable measures to ensure that: a) explosives are not brought to the working face where blasting is to be carried out unless- i. the drilling of shot holes has been completed; ii. the shot holes are ready to be charged with explosives; iii. the quantity of explosives does not exceed the estimated required quantity to be used for the blast; and iv. <u>a safe distance, to which explosives may be brought to the working face where drilling of shot holes is not completed, is determined by means of a risk assessment conducted by the employer in consultation with the explosives manufacturer or supplier.</u>	<i>[Provision 4.6(3)(a)(iv) is a new addition to the regulations. Employers previously needed to apply for exemption in terms of regulation 3.15.1 of the Minerals Act]</i> The employer at any underground mine must take reasonable measures to ensure that if explosives are <i>brought to a working face where drilling of shot holes is not completed, the closest such explosives can be brought to the face must be a safe distance determined by means of a risk assessment conducted by the employer in consultation with the explosives manufacturer or supplier.</i> <i>Figure 2: Explosives Accessory Bag</i>

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.6(5)(b) The employer of every surface mine must take reasonable measures to ensure that: (b) except with the written permission of the Principal Inspector of Mines, explosives are not brought to the working place where blasting is to be carried out until the shot holes are ready to be charged with explosives and the quantity of explosives brought to the working place do not exceed the estimated required quantity.	4.6(5)(b) The employer at any surface mine must take reasonable measures to ensure that: (b) explosives are not brought to the working bench where blasting is to be carried out unless: - the drilling of shot holes have been completed; - the shot holes are ready to be charged with explosives; - the quantity of explosives does not exceed the estimated required quantity to be used for the blast; and - a safe distance, to which explosives may be brought to the working bench where drilling of shot holes is not completed, is determined by a risk assessment conducted by the employer in consultation with the explosive manufacturer or supplier.	<i>Previous regulations required the employer at a surface mine to ensure that PloM's permission is obtained before the correct amount of explosives could be brought to the working place when shot holes are ready to be charged with explosives.</i> <i>New regulations clearly lists conditions under which explosives may be brought to the working bench and further require that a risk assessment be conducted by the employer in consultation with the explosives manufacturer or supplier to determine a safe distance to which explosives may be brought to the working bench where drilling of shot holes is not completed..</i> <i>Figure 3: Section/Slope Layout</i> NB: Figure not to scale or any mine standard but only intended for illustration purposes

	4.6(5) (c) The employer at any surface mine must take reasonable measures to ensure that: the competent person referred to in regulation 4.4(1) does not initiate any explosive charge unless the portion of the shot hole between the explosive charge and the collar of the shot hole is stemmed and tamped in accordance with the requirements of regulation 4.14;	<i>This is a new provision for surface mines, requiring the stemming and tamping of shot holes after a risk assessment is done to determine the length.</i>
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Precautionary Measures for Misfires, Sockets and old Explosives

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.11(6)(b) In all surface mines the competent person referred to in regulation 4.4(1): (b) Drills or causes to be drilled in the presence of such competent person, a relieving hole not less than 150mm deeper than the misfired hole and which relieving hole is parallel to and not nearer than one meter to the misfired hole and that such competent person charges and initiates this relieving hole and recovers the explosives liberated from the misfired hole	4.11(6)(b) At any surface mine the competent person referred to in regulation 4.4(1): (b) drills or causes to be drilled in the presence of such competent person, a relieving hole not less than 150 millimetres deeper than the misfired hole and which relieving hole is parallel to and not nearer than a distance determined by risk assessment to the misfired hole and that such competent person charges and initiates this relieving shot hole and recovers the explosives liberated from the misfired hole. The risk assessment must consider the following: i. hole diameter; ii. hole depth; iii. burden and spacing; and iv. geology	<i>The regulation details the measures to be included in a written procedure that must be prepared and implemented by the employer in consultation with the explosives manufacture or supplier to prevent persons from being exposed to the significant risk associated with misfires, sockets and old explosives.</i> <i>Previous regulations specified a parallel distance of one metre between a misfired hole and a relieving hole. This distance is not always practical as it might (i) lead to drilling in unstable rock conditions and/or (ii) lead to intersecting an explosives column, with a high risk of detonation.</i> <i>Current regulations require that the distance between a misfired hole and a relieving hole be determined by a risk assessment and further details the minimum specifications that must be considered in the related risk assessment.</i>

Precautionary Measures for Marking, Drilling and Blasting

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.12(1)(a)(ii) In underground mines: (a) before the competent person referred to in regulation 4.4(1) points out or marks any shot hole for drilling, such competent person: (ii) searches for any misfired hole or socket within a distance of at least two metres from the proposed position or mark;	4.12(1)(ii) At any underground mine before the competent person referred to in regulation 4.4(1) points out or marks any shot hole for drilling, such competent person: (ii) searches for any misfired hole or socket within a distance of at least the length of the drill steel used in all directions from the proposed position or mark;	<i>The regulation details the measures to be included in a written procedure that must be prepared and implemented by the employer in consultation with the explosives manufacture or supplier to prevent persons from being exposed to the significant risk associated with marking, drilling and blasting of shot holes.</i> <i>In previous regulations, the search for any misfired hole or socket before the position of a shot hole is pointed out or marked for drilling was set to a minimum of two metres from the proposed position or mark.</i> <i>In the current regulations, the distance to search for any misfired hole or socket before the position of a shot hole is pointed out or marked for drilling is set to a minimum of the length of drill steel to be used for the drilling of such shot hole..</i>

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.12(2) In surface mines: (a) before any competent person referred to in regulation 4.4(1) points out or marks any shot hole for drilling or authorises any other person to point out or mark the position and direction of any shot hole for drilling, such competent person searches for any misfired hole or socket within a distance of at least two metres from the proposed position or mark. (b) no person drills or causes or permits to be drilled any shot hole in any surface mine where there is known to be a misfired hole unless the shot hole is so drilled that it will nowhere come nearer than two metres to the misfired hole or unless the misfired hole has been dealt with in accordance with the provisions of regulation 4.11(3)	4.12(3) At any surface mine: (a) before any competent person referred to in regulation 4.4(1) points out or marks any shot hole for drilling or authorises any other person to point out or mark the position and direction of any shot hole for drilling, such competent person searches for any misfired hole or socket within a distance referred to in regulation 4.11 (6)(b). (b) no person drills or causes or permits to be drilled any shot hole, unless: - it is placed at a distance as referred to in regulation 4.11 (6)(b) from any socket and is drilled in such a direction that it will nowhere come nearer than such determined distance from the socket; - it is a shot hole that deviated from the position and direction indicated in paragraph (a) above;	<i>The regulation details the measures to be included in a written procedure that must be prepared and implemented by the employer in consultation with the explosives manufacture or supplier to prevent persons from being exposed to the significant risk associated with marking, drilling and blasting of shot holes.</i> <i>New regulations require that a risk assessment be done to determine the distance within which to search for misfired holes or sockets before pointing out or marking the position and direction of shot holes for drilling; or before drilling or causing or permitting any shot hole to be drilled. Where applicable, the hole will be drilled in a direction that it will never come closer than the determined distance from the socket. This distance will be the same as the distance determined by risk assessment that a competent person may drill a relieving hole close to a misfired hole; with clear consideration to the specifications of the hole as indicated in regulation 4.11 (6)(b).</i> <i>Previous regulations specified a distance of a minimum 2m to be searched for any misfires or sockets before pointing out, or marking the position and direction of shot hole to be drilled with drilling only allowed after the misfired hole has been dealt with.</i>  <i>Figure 4: Drilling of holes on a surface mine</i>

Shot Holes to be Stemmed and Tamped

New Regulation GG41904 2018	Comments
4.14 The employer at any mine must take reasonable measures to ensure that: (3) the material used for stemming and tamping complies with SANS 120:2009, Edition 2 "Stemming for use in blasting "	<i>This is a new provision in the regulations. A list of accredited laboratories where stemming material must be tested to be provided by the DMR in due course. The following tests will be performed by accredited laboratories:</i> 1. <i>Flame resistance</i> 2. <i>Toxicity</i> 3. <i>Electrostatic build-up</i> 4. <i>Chemical reactivity</i>



Figure 5: Opencast mining operation

General Precautions

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
14.16(2) no blasting operations are carried out within a horizontal distance of 500 meters of any public building, public thoroughfare, railway line, power line, any place where people congregate or any other structure, which it may be necessary to protect in order to prevent any significant risk, unless: a) a risk assessment has identified a lesser safe distance and any restrictions and conditions to be complied with; b) A copy of the risk assessment, restrictions and conditions contemplated, in paragraph a) have been provided for approval to the PloM c) Shot holes written approval has been granted by the Principal Inspector of Mines; and d) any restrictions and conditions determined by the Principal Inspector of Mines are complied with.	14.16(2) no blasting operations are carried out within a horizontal distance of 500 meters of any public building, public thoroughfare, railway line, power line, any place where people congregate or any other structure, which it may be necessary to protect in order to prevent any significant risk, unless: a) a risk assessment has identified a lesser safe distance and any restrictions and conditions to be complied with; b) a written application is submitted to the Principal Inspector of Mines accompanied by the following documents for approval- i. a sketch plan indicating the distance from the blasting area to the affected structures; ii. the risk assessment; iii. a proof of consultation with the owners of the affected structures; and iv. restrictions and conditions. c) a written approval has been granted by the Principal Inspector of Mines; and d) any restrictions and conditions determined by the Principal Inspector of Mines are complied with.	<i>Previous regulations did not have provision for providing PloM with sketch plan and proof of consultation with structure owners when applying for blasting permission</i>  <i>Figure 6: Example of public structure</i>

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
4.16(8) the competent person referred to in regulation 4.4(1): (d) except as may be necessary to re-initiate a misfired hole; does not insert more than one detonator into an explosive charge, provided that in wet workings two detonators may be used only if they are both inserted into the same cartridge and securely fastened to it;	4.16(8) the competent person referred to in regulation 4.4(1): (d) except as may be necessary to re-initiate a misfired hole or specialised blast design for holes more than 4 meters in length; does not insert more than one detonator into an explosive charge, provided that in wet workings two detonators may be used only if they are both inserted into the same cartridge and securely fastened to it;	New provision in regulations allows for more than one detonator in an explosives charge in specialised designs of more than 4m in length, where one detonator would lead to a misfired hole.
4.17 No person: (1) may drill or cause to be drilled or blast any shot hole in a subterranean tunnel intended to be used for purposes other than extracting minerals, unless- (a) a risk assessment has identified a safe distance to blast such a shot hole and any restrictions and conditions to be complied with; (b) a copy of the risk assessment, restrictions and conditions contemplated, in paragraph (a) have been provided for approval to the Principal Inspector of Mines; (c) a written permission has been granted by the Principal Inspector of Mines; and (d) any restrictions and conditions determined by the Principal Inspector of Mines are complied with;	4.17 No person: (2) may drill or cause to be drilled or blast any shot hole in a subterranean tunnel intended to be used for purposes other than extracting minerals, unless- (e) a risk assessment has identified a safe distance to blast such a shot hole and any restrictions and conditions to be complied with; (f) a written application accompanied by the following documents is submitted to the Principal Inspector of Mines for approval- (i). a sketch plan, (ii). the risk assessment, (iii). restrictions and conditions; (g) a written approval has been granted by the Principal Inspector of Mines; and (h) any restrictions and conditions determined by the Principal Inspector of Mines are complied with;	New regulations require that a sketch plan is provided to the Principal Inspector of Mines when applying to drill or blast any shot hole in a subterranean tunnel for purposes other than extracting minerals

Chapter 22 – Schedules (Definition of Competent Person)

Old Regulation GG38970 2015	New Regulation GG41904 2018	Comments
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22.4.1(1) For purposes of regulation 4.4(1) 'competent person' means a person who is in charge of workmen in a working place at a mine and who is the holder of a certificate or qualification recognised by the Department for this purpose, valid for the class of mine to which the mine belongs.	22.4.1 For purposes of regulation 4.4(1) 'competent person' means a person who is a holder of the following certificates recognised by the Department for this purpose, valid for the class of mine to which the mine belongs: a) Blasting certificate issued by the Department until 30 June 2009; or b) Rock breaker or equivalent certificate issued by the Mining Qualifications Authority from 01 July 2009 to 31 May 2017; or c) Blasting certificate issued by the Department with effect from 01 June 2017.	<i>New definition of competent person is effective as from 14 December 2018.</i>
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Self –Assessment questionnaire to test the understanding of the Amendments to the New Explosives Regulations:

1. How does the new explosives regulations differ from the old regulations with regards to the definition of “hot holes” ?
 - The definition is now more specific to coal mining operations because when old coal workings are exposed to the atmosphere and water for a prolonged time during the opencast mining phase, spontaneous combustion of the coal in the old workings occurs and spread into overburden rocks and strata as well.
2. What ADDITIONAL requirements are provided for in the new regulations with regards to destruction of explosives within 150m of structures to be protected?
 - The new regulations require the employer to provide the PloM with a sketch plan indicating (i) the distance from the explosives destruction area to the affected structures, and (ii) proof of consultation with the owners of the affected structures.
3. Under what conditions can explosives be brought closer to the working place before drilling of shot holes is completed?
 - The employer at any underground mine must take reasonable measures to ensure that if explosives are brought to a working face where drilling of shot holes is not completed, the closest such explosives can be brought to the face must be a safe distance determined by means of a risk assessment conducted by the employer in consultation with the explosives manufacturer or supplier
4. With the new regulations, is there any differences between bringing explosives to a working place where shot holes are to be charged with explosives?
 - No both regulations now provide clear conditions under which explosives may be brought closer to the working face to be charged with explosives and further provides for the employer to consult with the explosives manufacturer to determine, by means of a risk assessment, a safe distance that explosives may be brought closer to the area to be charged with explosives even when the drilling of shot holes is not yet completed.
5. In the past the regulations provided that the employer’s written procedure to a relieving hole must be drilled in parallel and not closer than one metre from a misfired hole. What has changed now?
 - The new regulations provide that a relieving hole must be drilled parallel to and not nearer than a distance determined by risk assessment to the misfired hole. The risk assessment must consider the hole diameter, the hole depth, the burden and spacing; and the geology.
6. What has changed as far as precautions to be taken before the competent person points out or marks the position of a shot hole to be drilled in underground mines?
 - *In the current regulations, the distance to search for any misfired hole or socket before the position of a shot hole is pointed out or marked for drilling is set to a minimum of the length of drill steel used. In the past the distance was set at a minimum of two (2) metres from the position of the shot hole to be marked.*

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