

# Safety regulations

Date: Nov. 23<sup>rd</sup> 2016

Safety regulations for the firing of pyrotechnical effects and aerial shells by using e-matches:

The following instructions are for your understanding about important and basic safety principles.

Our general safety requirements are based on our own experience plus the contact and feedback from our customers. These rules allow the safe and successful usage of all components of our wireless firing systems. With proceeding development of our products, we will continuously revise and adapt the safety standards in conclusion with your notifications and support.

The following safety regulations are part of all our operation manuals within our product range. These regulations are also available in printed form and can be downloaded via our internet homepage at any time. Please forward these instructions to any relevant persons in your company dealing with this topic.

Any technical device can potentially cause a fault. This could be encouraged through: wrong usage, unit damage, unit aging as well as the wear and tear of the unit. This fundamental thesis was the basic principle when writing these instructions.

1. Smoking or open fire is strictly prohibited within the safety zone!
2. Depending on the type, size and quantity of the pyrotechnical effects that are being used and depending on the local conditions, allocate the necessary fire prevention and first aid measurements.
3. In all cases respect and follow any national and technical regulations as well as the operation manuals respective to the pyrotechnical effects in use.
4. Make sure that non authorized persons are not within the vicinity of the pyrotechnical effects and to the respective firing system.
5. The safety boundary distances required by the manufacturer and authorities are to be respected. Secure the area so that non authorized persons cannot gain access to the same.
6. The operation manuals and safety instructions of the pyrotechnical manufacturers must be observed at all times. If in doubt these must be discussed with the relevant safety organisations.
7. The usage of pyrotechnical effects as well as the respective firing systems are only allowed to be used according to it's defined function.
8. The components of our firing system are to be covered or encased against burn-off cinders or weather conditions where necessary. Electrical contacts should be protected against corrosion, soiling and damage plus they should be cleaned regularly.
9. The contacts of the pyrotechnical articles or their e-matches, which have not yet been connected, must always be short circuited.

10. We recommend to have our products inspected every one to two years. Along with the testing of the rechargeable battery, a visual test as well as a functional test will prove that the operational safety standards are still met.
11. Do not use damaged equipment. If a damage is found, immediately send the device back to the manufacturer for professional repair. Our warranty for the proper function for our equipment is only for components of our system, which have no damage.
12. Any changes in the devices or to the firing system as well as repair work on the units other than that through the manufacturer will invalidate any warranty claims and our product liability will be void. Should repair of the units be necessary, then we do require a detailed report of the problem.
13. Please make sure when lending or renting out the equipment, that no damage has occurred during the rental period of the units. Advise your staff, that it is very important to report any possible damage of the units immediately. Customers, which have borrowed or rented the equipment are hereby informed, that it is their duty to report any damage found or suspected on the unit when returning such.
14. Wire connections from the firing device to the e-matches are always to be insulated. At the same time avoid wire damage, for example through heat, cable twisting, cable pinching and burn-off cinders or through forced piercing. All cables must be checked before each use on it's faultless construction. When using used wires we do recommend a continuity and short circuit test between each insulated connection before using it again.
15. The firing of igniters in accordance with 'SprengG' (i.e. German explosives law) is not allowed with our products. For this purpose only firing units with a BAM certification in accordance with §5 'SprengG' or equivalent are allowed. The same applies to high explosives.
16. Avoid unintended firing through electrostatic charging. When using e-matches, make sure that you only use those types, which are protected against unintended firing through electrostatic discharges. The e-matches you use should also have a BAM certification or equivalent.
17. Avoid possible or even physical contact of the e-matches or their firing lines with other conductible materials if the possibility is given that either a static discharge or potential equalization can arise.
18. Make sure that no unintended firing possibilities are given. Commonly caused either through strong electrical, magnetic, electromagnetical fields as well as other voltage sources.
19. An often underestimated risk are unintended firings due to live contacts found as charging contacts on mobile phones, walkie talkies as well as rechargeable battery driven tools. Even when due care and attention is taken, a battery pack or similar can be a hazard when dropped especially when live contacts are revealed.
20. Unintended firing can be caused by thunderstorms or the electrostatic fields during the drawing up of a thunderstorm. We recommend clearing and securing the area in question.
21. Another possible danger for unintended firings are potential equalization currents. Be aware that these currents may occur in between conductive building segments themselves or between these conductive

segments and earth potential. Neither e-matches nor wiring should come in contact with such segments.

22. Please be aware that through your pyrotechnical effects ionized gases are created. The thereby produced ions increase the conductivity within the air. This ionization process can cause an electrical arcing especially within the vicinity of high voltage overland cables. This may lead to lethal consequences for the pyrotechnicians and other persons. Please note that wind conditions can be totally different a few meters above the ground.

23. Please assure that the firing can only be initiated through the pyrotechnician. Keep firing system under lock and key! Within our safety concept, all firing systems are set with individual codes, which inhibit unintended and accidental firing through third parties. If requested we can also supply systems with the same coding. This may be necessary if in a company more than one transmitter is used or when companies exchange the units between each other.

24. With our using the key code numbers 901 and 311, we are using a standard key code, which can also be found in other products. On a customer's request we can also supply other key codes.

25. Please ensure that the relevant safety distances are met by everybody. The safety margins are to be kept as from the beginning of the project until the pyrotechnician releases the area after firing and containment of unfired effects and shells.

26. Connect at all times first the e-match to a 100% non-live firing line, which is also not connected to a firing unit. A pyrotechnical effect is given from the time onwards as 'armed' when the e-match wires are connected to the firing unit. This is independent if the units are on or off!

27. In the interest of your own safety and protection of the devices always use a sufficient length of firing wire.

28. Along with a sufficient length of firing wire you should ensure also the following:

In the field of display fireworks: The fireworks shells are only allowed to be loaded after the mortars have been stabilized and secured. Only after loading it is then allowed that the e-matches are connected to the respective firing units. At all times the most important rule is to never put your head or other part of the body into or over the mortar opening. This would also apply to other pyrotechnical effects.

In the field of special effects: Depending on the explosiveness of the pyrotechnical effects or materials that are being used it is advisable to proceed with higher care and attention (lies within the pyrotechnician's responsibility) and this could include for example a short circuit bridge over the contacts of the e-match to prevent unintended firing. Also it is possible to make a physical switch breakage in the firing line, which is only then closed when all safety regulations are met and kept! Should there be any unclarified situations, then discussions with the safety authorities are to be taken until all is clear for everyone. When it comes to the safety of your projects we are at all times at your disposal to develop a customized safety concept.

29. Make sure the devices are switched off before connecting the e-matches.

30. When stripping the cable insulation of the igniters and connecting them, you have to make sure that they are not stripped so long so that the conductors can touch each other. Short circuits between different outputs must be avoided by all means because this may cause unwanted firings.

31. When checking the various system parameters as well as during firing, nobody is allowed within the danger zone.

32. After the effects have been fired, an ample amount of time should be given before disassembling the pyrotechnical setup. Before securing possible unfired effects first disconnect the corresponding wiring and then switch off the receivers. Especially in the field of special effects, during the installation special care should be taken of how to disassemble unfired effects or installations in a safe way.

33. Make sure that only original parts (e. g. chargers, connectors, etc.) are used. Otherwise the warranty and claims under product liability will expire.

34. When using receivers inside of Zarges cases it is important to make sure that the top case (aluminium top) is closed during the fireworks display. The latches of the bottom case have to be locked to the top case. There is still enough space for the wires of the e-matches going out on both sides of the case. This guarantees the safety and protection of the receiver and also prevents opening of the top case due to windy conditions.

35. Read the user manual of all devices completely and follow all given instructions. Teach your staff and everyone in your company who will work with the devices.