

Effect of Storage Temperature on Explosion Characteristics of RDX-based Thermobaric Explosive

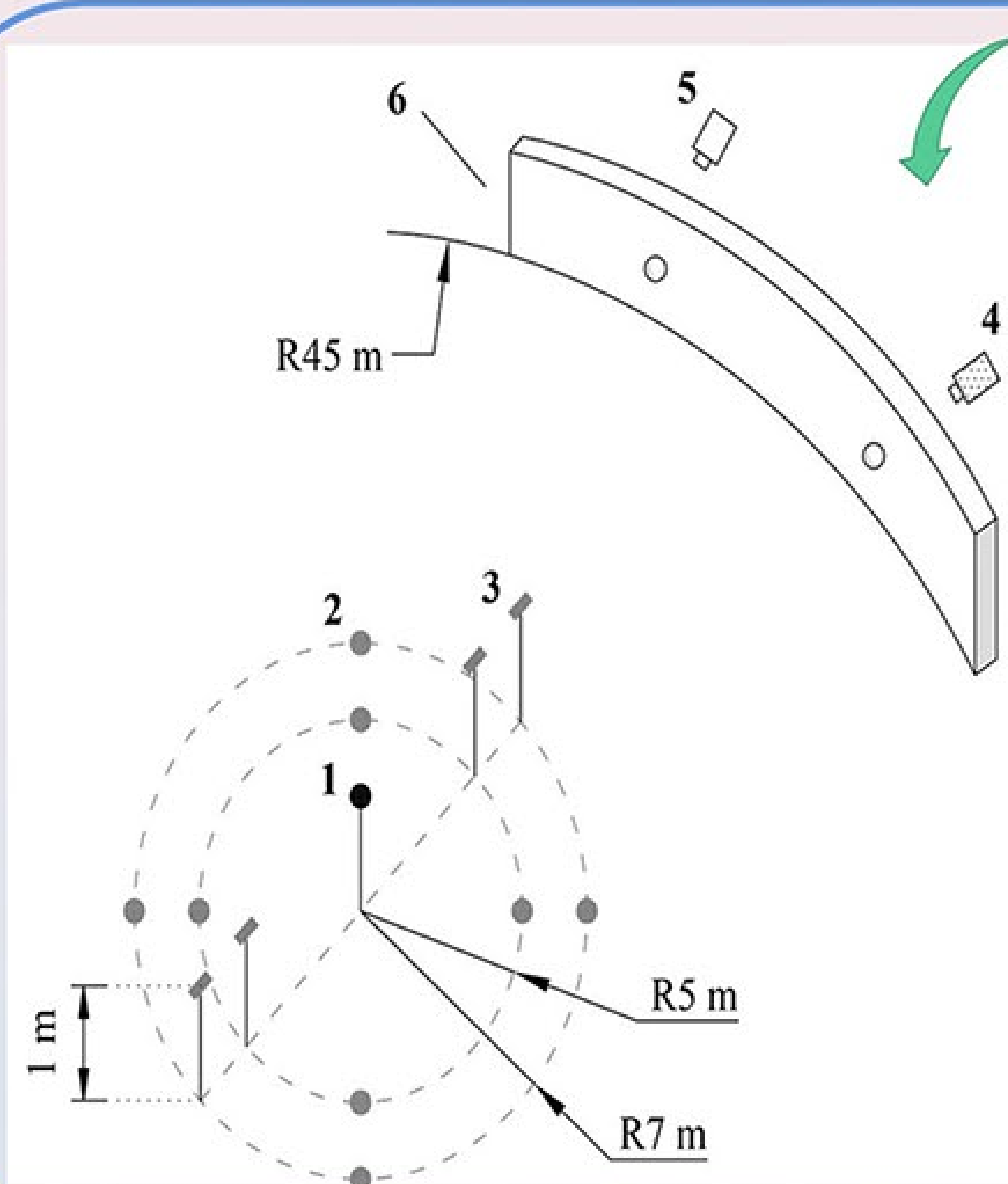
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Abstract: The effect of storage temperature on explosion characteristics of the free space explosion of RDX-based thermobaric explosives was studied, and the fireball and the overpressure of reflected blast waves and air blast waves were obtained. Based on overpressure, temperature and volume of the fireball, the effects of storage temperature on pressure, thermal and afterburning reaction have been investigated.

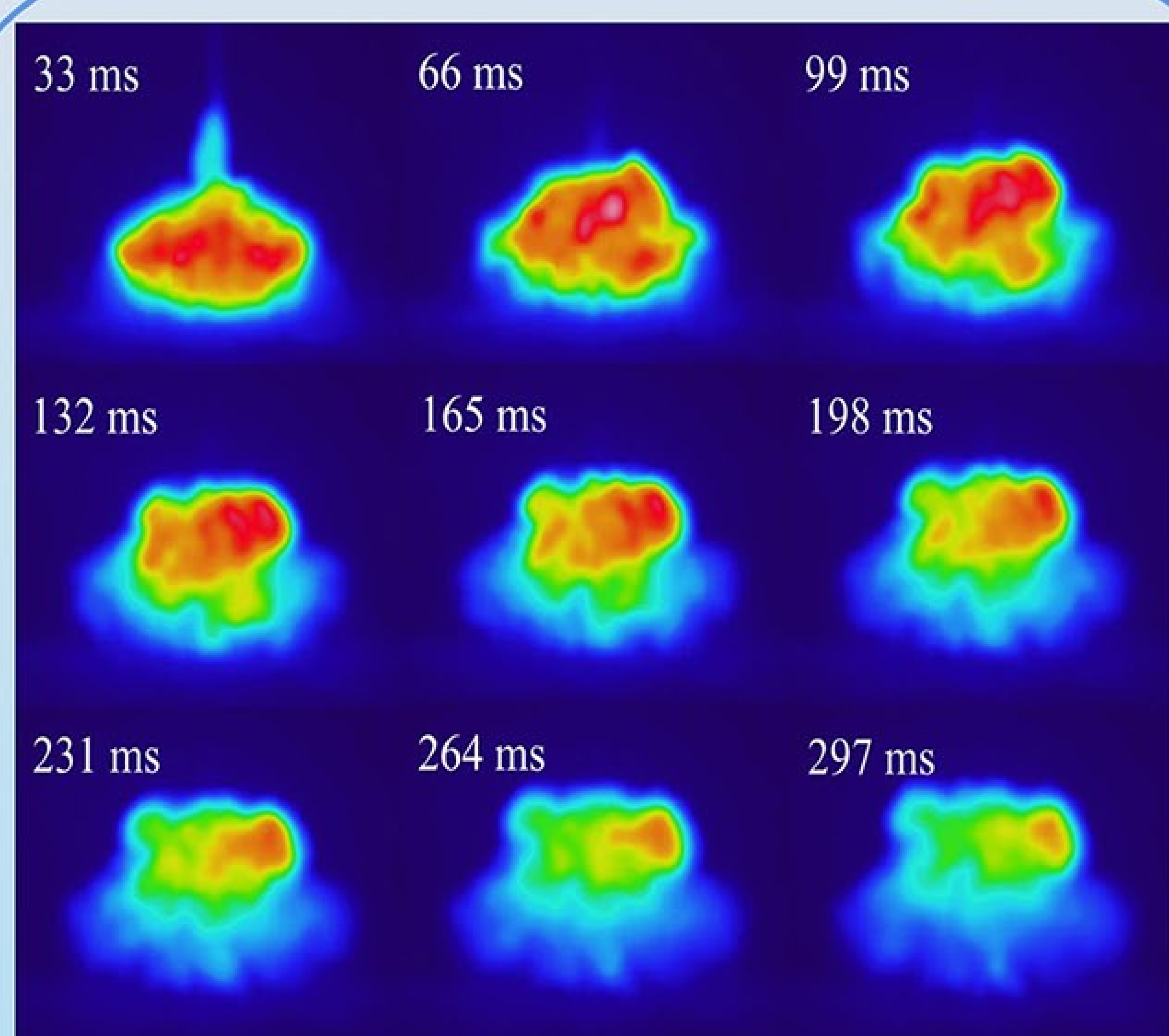
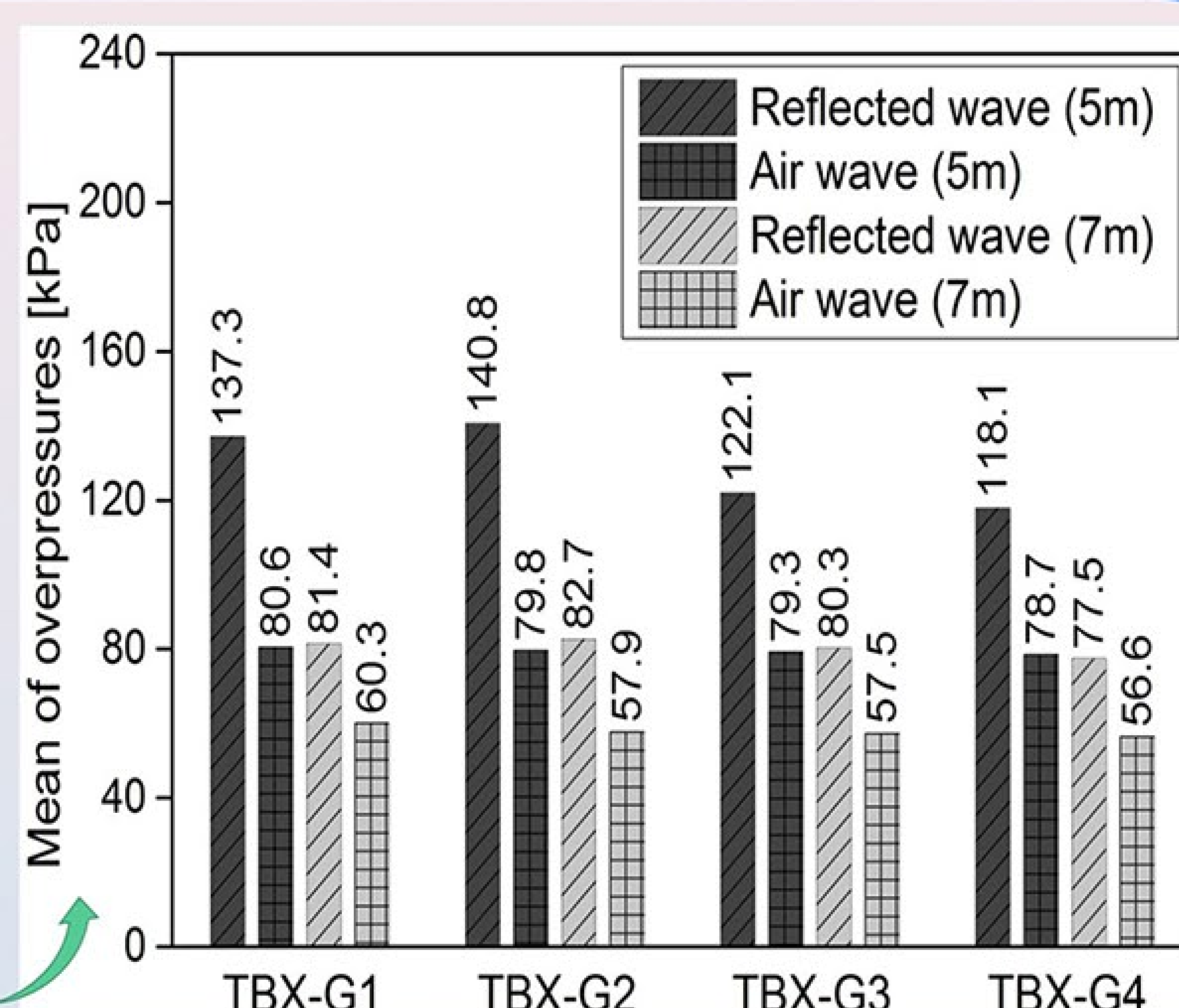
Name	Mode	The temperature and duration of storage
TBX-G1	Normal temperature	Stored at 25 °C for 48 h.
TBX-G2	High temperature	Stored at 65 °C for 48 h.
TBX-G3	Low temperature	Stored at -50 °C for 48 h.
TBX-G4	Temperature shock	Store at 65 °C and -50 °C for 2 hours respectively, then repeat that 3 times.

Test charges: Before the test, the charges were stored in four incubators with different temperatures. After the charges were restored to 25 °C, the explosion tests were performed immediately. The mass of each pressed cylindrical charge was 2.5 kg.

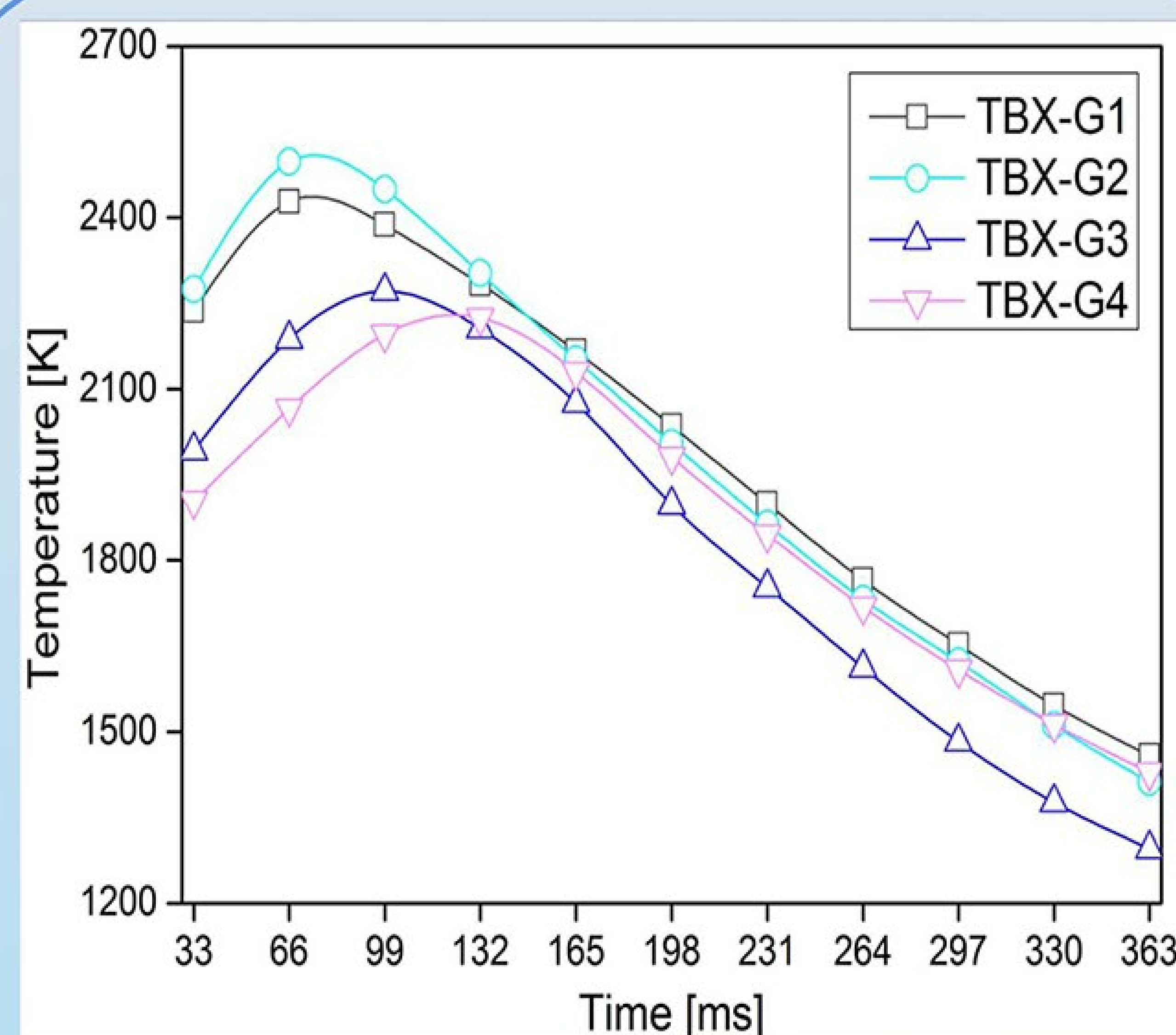


Experiment: Test charges were fixed at a distance of 1 m from the rigid ground. Taking the axis projection of the charge as the center, the pressure gauges were arranged at a radius of 5 m and 7 m.

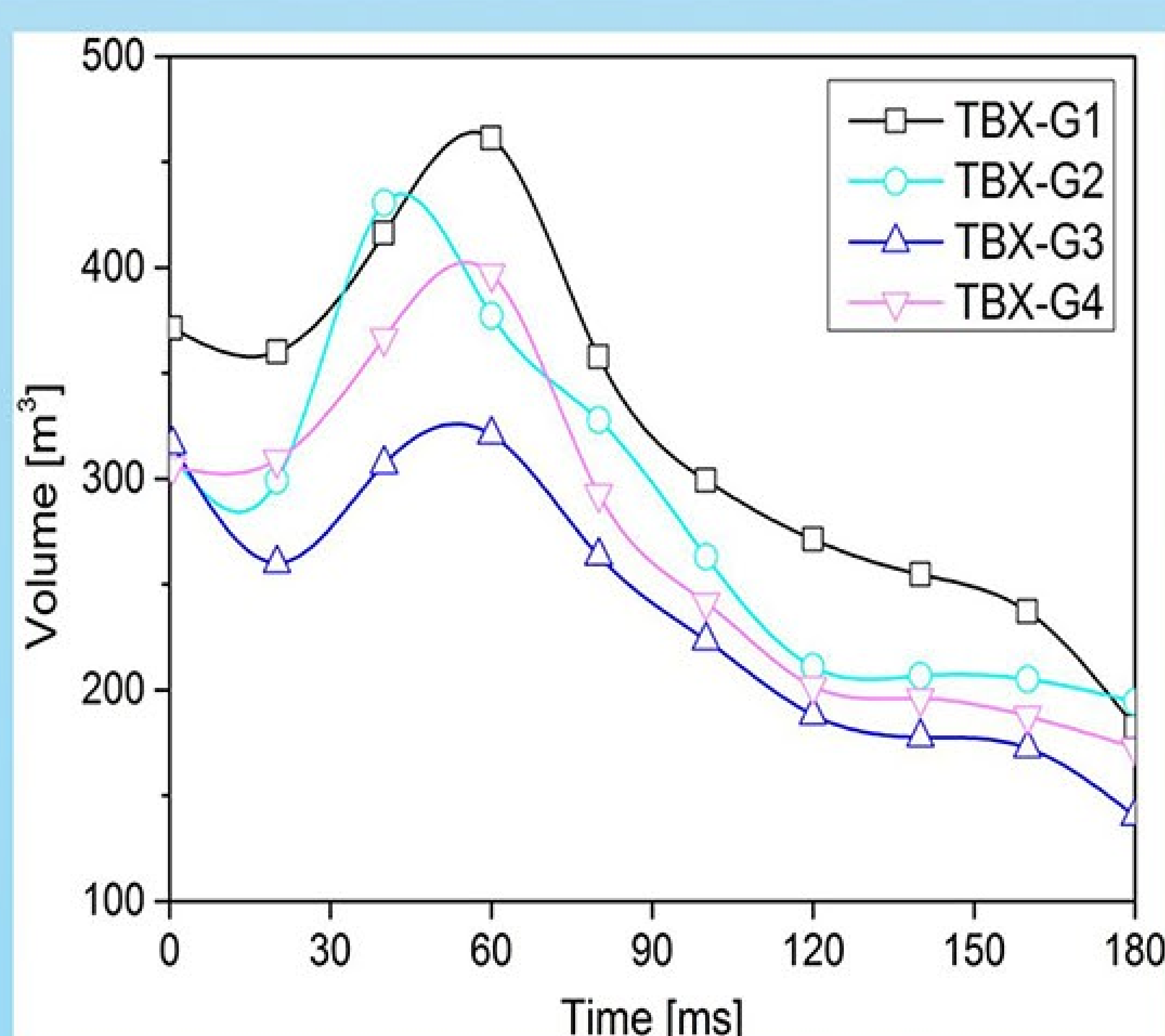
Overpressure: It shows that the storage temperature affected the overpressure of the charges.



Fireball: Figure showed the typical fireball infrared cloud image of TBX-G2.



Temperature: The change of the fireball temperature with time.



Volume: The change of the fireball volume over time.

Conclusions

- The storage temperature affects the pressure, especially the overpressure of reflected blast wave at 5 m. Compared with the normal temperature, the overpressure of the low temperature and the temperature shock decreased by 12.4% and 16.2%.
- The maximum volume of the fireball can reach 400 m³. The fireball volume of charges storage at low temperature and temperature shock is reduced by about 43.7% and 16.2% respectively compared to the normal temperature.
- The fireball can last for hundreds of milliseconds, and its maximum temperature can reach 2400 K. Low temperature and temperature shock will reduce the fireball temperature by more than 6%.