

*Nammo Raufoss AS Test Center*



**Nammo**  
NORDIC AMMUNITION COMPANY

## *Nammo Raufoss AS Test Center*



Nammo Raufoss AS Test Center at Bradalsmyra is located close to the Raufoss Industrial Park. The Test Center has great expertise in the field of testing various types of ammunition, rocket motors, space components and other high technological parts for both military and civilian use, based on more than 70 years of experience.

The Test Center covers an area of approximately 4000 dekar (900 acres) and is divided into different firing ranges.

Environmental testing is performed in an advanced facility according to strict military and civilian standards.

Advanced measuring techniques and photo equipment is employed to verify performance according to specifications.

The Test Center's main customers comes from the local development, qualification and manufacture of defence products and civilian parts.

However, we are experiencing an increasing demand for our unique capabilities from customers home and abroad.

The Test Center is approved according to the strictest civilian and military standards:

ISO 9001

AQAP 110



## *The Firing Range*

Test firings are the most exact way to verify that advanced military equipment meets the strictest requirements. For firing of most kinds of conventional ammunition from 7.62 rifle to 155 artillery and rockets we can offer 10 different ranges from 100 to 2000 meters, all equipped for advanced measuring of internal, external and terminal ballistics. When long distance firings are required, the Test Center has access to other firing ranges. Rocket motors and warheads are subject to static testing in specially designed bunkers. A special range is used for testing smoke products. Each year we welcome a great number of visitors for demonstrations from all parts of the world.



## *Environmental testing*



Environmental testing is today's method of ensuring that tomorrow's products live up to their specifications in service and will not fail when the going gets tough.

Since 1956, Raufoss has developed a comprehensive range of environmental simulation facilities.

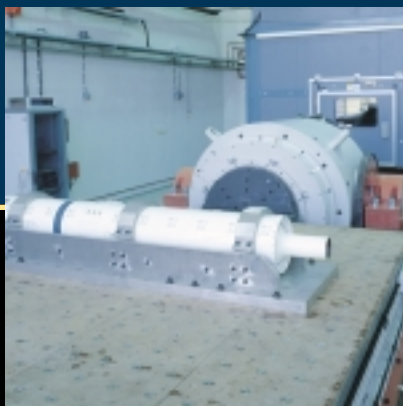
### *Vibration/Shock systems*

The vibration and shock tests is performed to determine that equipment is constructed to withstand expected dynamic stresses and to ensure that performance degradation or malfunctions will not be produced by the in-service vibration environment. Three electromagnetic systems, are employed to conduct vibration and shock tests.

Thrust capacity range from 5.3 kN to 280 kN.

The machine LDS 994 is the most powerful serial produced machine in the world and conducted to the 2.5x2.5 meters sliptable, the system is able to test large and heavy objects.

All vibration tests may be performed in combination with extreme temperatures. Working range:



Temperature	Freqv.	Max. displ.	Max. acceleration		
			sinus	random	shock
-60 to 80°C	0-2 kHz	50.8 mm pk-pk	75 g	60 g	100 g

### *Mechanical shock*

The shock test is applicable to equipment which is effected by sudden and transitory disturbances such as handling shocks. The Test Center is equipped with shock machines which are capable of handling items weighing up to 450 kg. Max. retardation is 600 g. Both half sine, trapez and squareshaped shock pulses are available.



### *Various mechanical tests*

#### *- LOOSE CARGO*

This arrangements simulates conditions experienced by packed and un-packed items transported as unsecured cargo on vehicle traversing irregular surfaces.

#### *- JOLT and JUMBLE*

This arrangements is used during development and production of fuses to check safety and ruggedness.

#### *- DROP*

The testcenter has 12 meter and 15 meter drop towers to determine if a component or apparatus has been designed for mechanical stability and ruggedness.

#### *- CENTRIFUGE*

This arrangement is used to give a constant acceleration radial directions.

#### *- STACKING*

Raufoss has facilities, drop and stacking-tests, to fulfill the Norwegian ADR requirements to "packing of dangerous goods".

### *Temperature, climate, salt fog/rain/vacuum*

Various chambers/room simulate temperature, humidity, salt fog/rain and low pressure which may be imposed on products operating in arctic, desert, tropical, marine or low pressure environments. Some of the individual parameters may be combined.

Working range:

Temperature	Humidity	Vacuum
-80°C to + 180°C	5 to 100% RH	1 BAR to 1 mBAR



*Loose cargo*



*Jumble*



*Temperature combined with vibration*

## *Measuring*

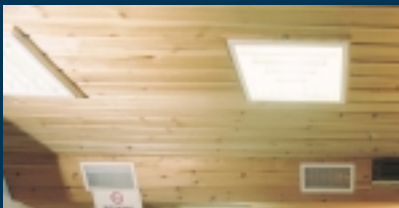


Today, most products are designed and tested via computer simulations. However, when it comes to verification of the calculated data nothing can substitute physical tests on the hardware itself.

Our experience is based on testing of a variety of technology products according to US Military, ESA and ISO standards, or specific customer requirements.

The level of instrumentation is specified by the customer or agreed in a dialogue between the customer and the Test Center.

Our main advantages is our competent staff, our well equipped facilities and our location close to the Raufoss Industrial Park.



### Facilities:

- VXI/NT dataaquisition systems
- Several portable data acquisition systems
- Radar systems for ballistic measurements
- Measurement of light (wavelength and intensity)
- Transducers and measurement of:
  - Velocity
  - Time
  - Pressure
  - Temperature
  - Deflection
  - Strain
  - Force
  - Acceleration
- Electronic laboratory
- Calibration
- Local Weather Station



## *Imaging and video systems*

An excellent picture of a product could say more than 1000 words.

We have systems for almost any purpose based on the requirements from testing of military products.

- High speed film cameras
- High speed digital video
- High speed motion recorder
- High power laser used for high speed synchronised lightning
- Flash X-ray (20 ns exposure)
- High quality, normal speed video systems
- Video editing
- Results on almost any media system



## *High pressure testing*

We can pressurise test objects up to 3000 bar and do repeated cycles up to 1300 bar.

### *Main activities:*

- Proof test
- Burst test
- Cycle (different temp.)
- High temp. creep
- Fire tests (pressurised)
- Bullet impact-tests (pressurised)
- Deep water tests

Some of the high-pressure tests can be done with instrumentation, video recordings and climatic conditioning. Other tests can be done on request.





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