

**Richard McGee**

**MOD**

**Qualification, Characterisation & Classification**



**Manager: Energetic Materials**  
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**“Qualification, Characterisation & Classification”  
Requirements for the Second Sourcing and  
Qualification of Energetic Materials**

**UK lead to NATO AC/310 SG-1  
Chair: SAG 15 EXPLOSIVES**

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**AIM**

**To describe departmental policy for the  
second sourcing of energetic materials,  
associated non energetic materials and how  
this applies to nitro-cellulose.**

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## Summary

- Introduction: Qualification & Type Qualification
- MOD Policy: Second Sourcing
- Key documents
  - ◆ OB Pillar Proc P104
  - ◆ Defence Standard 13-129
  - ◆ STANAG 4170 Ed2
- NC bench marking
  - ◆ Def Stan 68-182 - Cotton Linters
  - ◆ Def Stan 13-175 - NC mechanical nitration process
  - ◆ Mil-N-244A, NC
- Conclusions

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## STANAG 4170 - Qualification

Qualification is defined in STANAG 4170 as:  
The assessment of the explosive material by the National Authority according to this STANAG and AOP-7 to determine whether it possesses properties which make it safe for consideration for use in its intended role.

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## Type Qualification

Type Qualification is given when the explosive has been assessed as part of the design of the specific munition, and shown to be safe and suitable for military operation or training use in that role.

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## Explosive Safety

- 1. STANAG 4170 Ed/2 Principles and Methodology for the Qualification of Explosive Materials for Military Use.
- 2. OB Pillar Proc P104 Procurement of Munitions Involving a Change in Manufacture.
- 3. Defence Standard 13-129/2 Requirements for Explosive Hazard Data Sheets for MOD Use.

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## Aims of STANAG 4170

- a. To establish the concept & requirements for Qualification.
- b. To ensure only energetic materials fully characterised and assessed are Qualified for an intended role.
- c. To provide an acceptable and uniform basis to achieve Qualification status.

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## Defence Standard 13-129

Defines the principles and content of Explosive Hazard Data Sheets for Use by the MOD to ensure that all explosives can be safely manufactured, handled, stored, transported and disposed of.

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**Second Sourcing**  
**OB Pillar Proc P104 & STANAG 4170**

Qualification of an energetic material relates to a defined specification from a particular manufacturer and manufacturing location and using a particular manufacturing process. Where there is a change to:

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- ...
1. the Specification
  2. the source of raw materials
  3. the manufacturing process
  4. the manufacturer or manufacturing location
  5. a loss of know-how

Requalification or partial requalification may be required.

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**Def Stan 68-182**

Describes 3 types of cellulose in the form of bleached cotton linters.

**Def Stan 13-175**

Describes 6 types of NC with varying N<sub>2</sub> content, ranging from 12.1 - 13.35%.

**Mil-N-244A**

Describes 5 grades (& 4 types) of NC with varying N<sub>2</sub> content, ranging from 12.0 - >13.35%

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■ **Def Stan 68-182 - Cotton Linters**

- **Moisture**
- **Oil**
- **Ash**
- **Volubility (in NaOH)**
- **pH of aqueous extract**
- **Wood matter %**
- **Fibre length**
- **Fluidity**

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- Def Stan 13-175 - NC
- N<sub>2</sub> content
- Mineral content
- Settling test
- LBR test
- Ether/alcohol solubility
- Insoluble matter in acetone
- Sulfate as H<sub>2</sub>SO<sub>4</sub>
- Stability at 132°C
- Heat test at 77°C
- Calcium content

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- Def Stan 13-175 - NC Additional Tests (TBA)
- Mol Wt Distribution, e.g. by GPC
- Viscosity
- Mil-N-244A
- N<sub>2</sub> content, ether/alcohol solubility, acetone insolubility, ash, viscosity, fineness, 135°C heat test,

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## CONCLUSIONS

- Compliance with Defence Standard 13-129/2 is mandatory.
- Compliance with STANAG 4170 (second sourcing aspects) and OB Pillar Proc P104 is mandatory.
- GPC should be considered as a mandatory test in NC specifications, including Defence Standards.

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## FEEDBACK

### CONSTRUCTIVE COMMENTS

to

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**Questions**

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