Classification Product

- Number UN: UN0173
- Storage class: 1.4S or “out of pyro class”
- Not restricted by ITAR regulation

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CERTIFICATIONS SSE
ORGANISMES CERTIFICATEURS
SECURITE PYROTECHNIQUE ET ENVIRONNEMENT

MINISTÈRE DES ARMÉES

arianeGROUP

BUREAU VERITAS 1828
NF EN ISO 14001

CERTIFICATION QUALITE

ISO 9001 DEKRA Certification

EN 9100 DEKRA Certification

Contact

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SCAN ME

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NEW SPACE

SEP&FLY® – Separation Nuts for launchers and satellites

Pyroalliance designs a wide range of Separation Nuts and full Hold and Release Mechanisms (HRMs), used for the in orbit deployment of antenna reflectors and solar generators on satellites or used for the separation of satellites of a constellation, assembled on a dispenser.

With a recorded rate of in-flight success of 100% over more than 10000 separation nuts delivered until today to its customers, Pyroalliance provides with such separation nuts extremely reliable solutions of Hold down and release.

More generally, Pyroalliance delivers complete pyrotechnic chains adapted to its customers’ needs. They are designed and manufactured under Pyroalliance design authority.

SEP&FLY® FEATURES

Operating mode

The separation nut is a pyro-mechanism which performs two functions:
1. maintaining a pre-loaded assembly of two sets,
2. releasing the assembly upon an electrical order.

The energy required to achieve the release is provided by pressurized gas. The baseline is to inject into the mechanism a gas generated by a pyrotechnic initiator. An alternative solution is to inject a gas stemming from a pressurized pneumatic circuit.

Available options

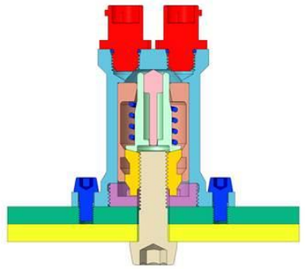
- **Different modules available**
  Pyroalliance has developed many different modules able to accommodate typical loads of 10kN, 20kN, 50kN and 200kN. They lead to different designs and the choice of various modules and bolt sizes M6, M10, M1/2' and M20… Depending on accommodation constraints, the initiators can be oriented distinctively either at 0° or at 90°.

- **Pyrotechnic or cold gas actuation**
  Although our Separation Nuts have been designed with a pyrotechnic actuation baseline, they can be actuated with cold gas stemming from a pneumatic source. The input pressure level shall simply be tuned to match with the requested triggering threshold defined by design.

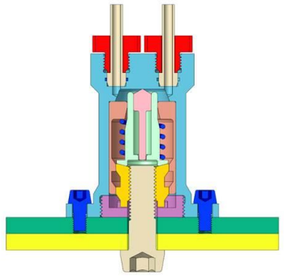
- **Ultra-low shock option**
  Pyroalliance has also developed a proprietary shock reduction solution based on a damping system that can be implemented on the various modules mentioned above. Such option can be considered if required to meet the shock requirements expressed by the customer.

- **Simple Separation Nut or full HRM**
  Again depending on the customers need, Pyroalliance offers an option to add a cup cone and a bolt catcher to the Separation Nut, thus building a full HRM (Hold & Release Mechanism) able to cope with shearing mechanical loads on top of the longitudinal loads.

- **Out of pyro class**
  Last but not least, Pyroalliance offers "out of pyro class" options. Not only the cold gas actuated Separation Nuts are by nature "out of pyro class". But pyrotechnically actuated Separation Nuts can also be declassified, going through a process with the relevant authorities that has led to a successful declassification, for those pyrotechnic Separation Nuts have shown the absence of any danger and any external effects.



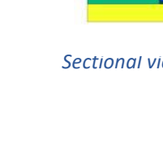
Sectional view with pyrotechnic initiators



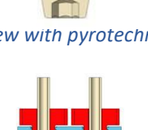
Sectional view with pneumatic input

Options matrix

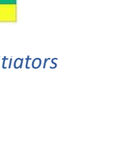
Choice of module	M6 / M10 / M1/2' / M20
Orientation of initiators	0° / 90°
Type of actuation	Pyrotechnic / Cold Gas
Ultra low shock option	No/Yes
Sep. Nut / HRM	Sep. Nut / Full HRM
Declassification	No/Yes



M10 HRM



M10 Sep.Nut Cold gas



M10 Sep.Nut

M6 Sep.Nut

M6 Sep.Nut / 90°

M20 Sep.Nut Cold gas

Benefits

- **Reliability**
  High reliability of the product is granted by the implementation of redundant gas input channels and the systematic in-factory functional testing (100%) of the mechanical part by cold gas actuation. After testing of the mechanical functioning, the hardware can be reset with a simple manual operation.

- **Level of shock**
  The level of induced shock on the payload is minimized using a Pyroalliance proprietary shock reduction solution enabling to meet the current market needs while preserving the reliability of the product.

- **Size and weight**
  Both size and weight are optimized for usage on launcher upper parts where those features are of utmost importance

- **Actuation time and synchronicity**
  By nature pyrotechnic actuators allow a very low actuation time and associated to a low standard deviation. Consequently high level of synchronicity is granted for several nuts activated simultaneously, as this is the case for holding satellites on dispensers.
  As far as cold gas actuation is concerned, Pyroalliance has also verified the achievable synchronicity performance which meets most of customer requirements.

- **Lead time and production rate**
  Depending on the selected combination of options, Pyroalliance can offer off-the-shelf designs that lead to a reduced lead time for the first item delivery (typically 6 months). In case the selected combination of options requires Non Recurring adaptation efforts, an optimized proposal will be established so as to qualify the related options set. In terms of production rate, Pyroalliance is equipped with a dedicated and stream-lined production workshop which has demonstrated the capability to deliver up to 200 separation nuts month.

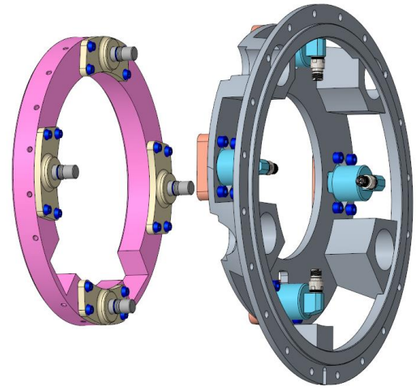
Applications

- Satellite appendixes deployment
- Satellite deployment from dispensers
- Inter-stage or fairing separations

Typical performances and features

Operation time (Typical values):	< 5 ms
Operating bolt tension:	Up to 200kN
Bolt dimensions:	From M6 to M20
Weight without initiators:	depending on module and options (starting from 120g)
Dimensions	depending on module and options
Operating temperature:	-60°C to +80°C
Initiators (if relevant):	2 NSI*

**NASA Standard Initiators*



Inter-stage separation assembly made of several separation nuts placed along the ring

Dispenser holding bunch of satellites thanks to separation nuts