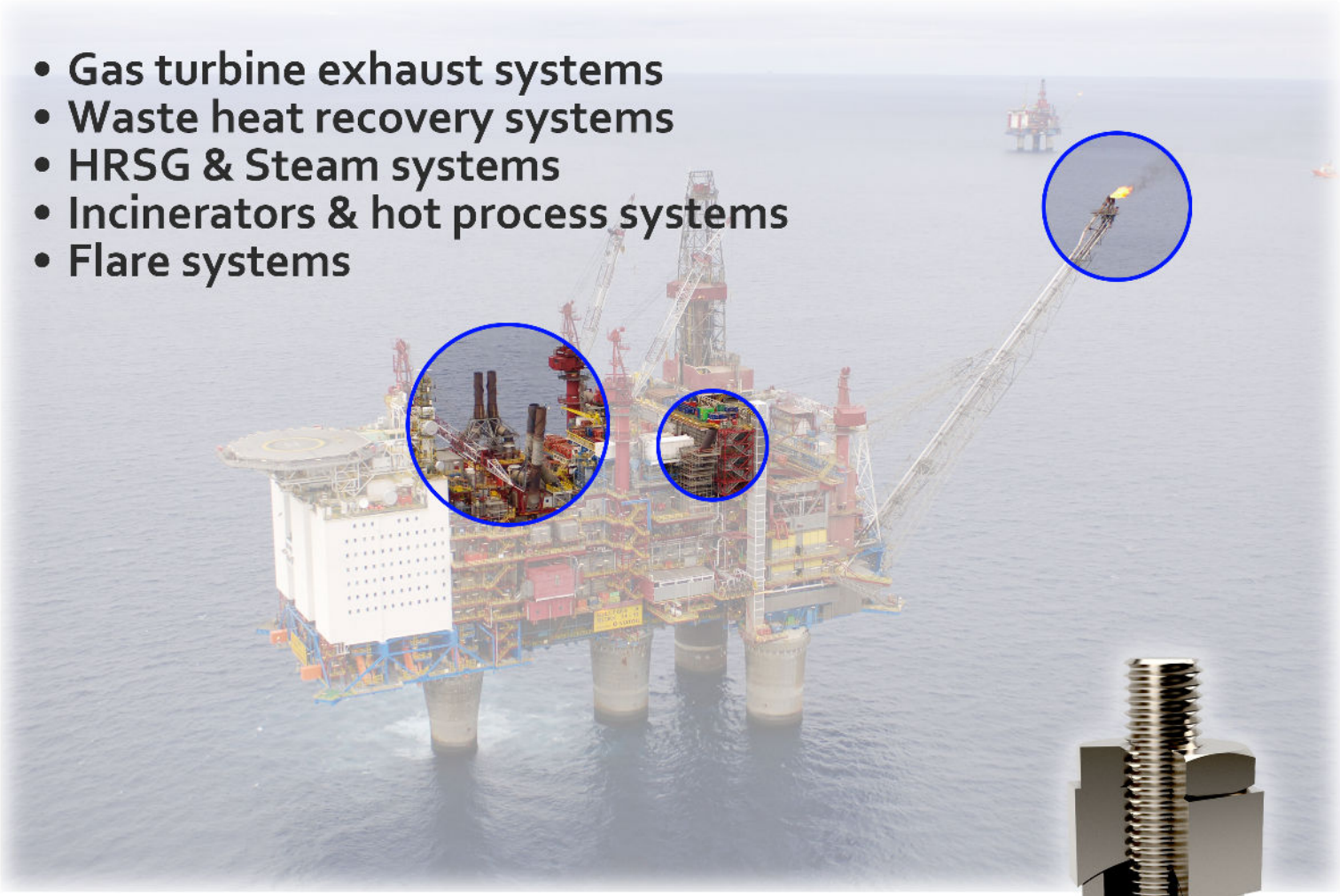
HotBolt™

Self-aligning Tension Bolts





Operating temperature:	Up to 1050°C
Material selection:	B7, B16, 422C, B8M, SS, Inconel 625 & 718, Duplex, Superduplex, Alloy 800, etc.
In complience with:	NORSOK, TR2000, and international Codes & Standards
Documentation:	Material certificates, FEM Analyses, Pre-stress calculations
Procedures:	Installation procedure
Installation:	Field installation and supervision services
Maintenance:	Field inspection, studies, recommendations, field maintenance work

HotBolt™ is in patent pending. Technical and / or commercial use of the product shall not be made without the written consent of Noble Installation AS

HotBolt™

The optimal solution for Gas Turbine Exhaust Systems and WHRU / HRSG

HotBolt™ is a bolt concept specially designed for use on steel structures exposed to elevated operating temperatures, heat cycles, and on steel structures exposed to temperature gradients.
The **HotBolt™**, being in Patent Pending, is a further development of traditional Tension Bolts available in the market.

The unique design of the **HotBolt™** allows for bolting of structures out of parallelism, and bolting of structures being severe warped and deformed due to heat cycles and temperature gradients.
Examples on such structures are Gas Turbine Exhaust Ducting, WHRU and HRSG units, Exhaust Diverter Valves, Incinerators, and Flare Tip Piping with Steel Structures.



Warped flanges cause improper installation of bolts.

Bolting of surfaces out of parallelism causes bending of the bolt, resulting in yield in washer faces and in threads.

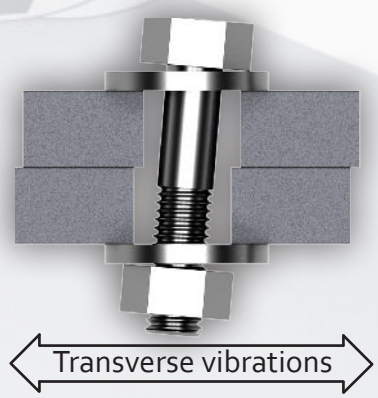
If exposed to heat cycles and/or transverse vibrations, such bolt connections will, by experience self-loosen over time.

Loose bolt connections may result in hazardous situations such as falling objects, exhaust leakages, fire, equipment breakdown and other unwanted conditions.

Standard bolt connections exposed to transverse vibrations does self-loosen over time.

Transverse vibration is movements between bolted materials.

Low Cycle Transverse movements may be caused by temperature gradients in bolted materials.





HotBolt™ is available with optional heat radiation shield.

Bolts connections exposed to high and low frequency transverse vibrations, and bolt connections exposed to heat cycles, has proven to self-loosen over time.

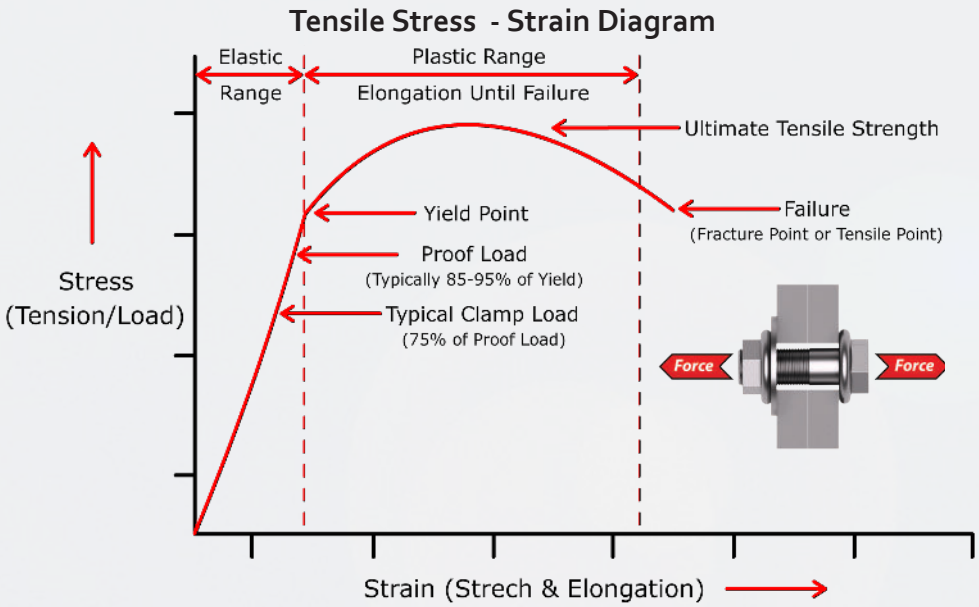
The use of double nuts or certain locking nuts is not a safe thread locking method.

HotBolt™ is supplied as standard with nut type SPIRALOCK self-locking threads.

HotBolt™ failsafe locking arrangement is available as an option.

HotBolt™ properties prevents the bolt connection to self-loosen, due to LC transverse movements.

The optimal solution for Gas Turbine Exhaust Systems and WHRU / HRSG

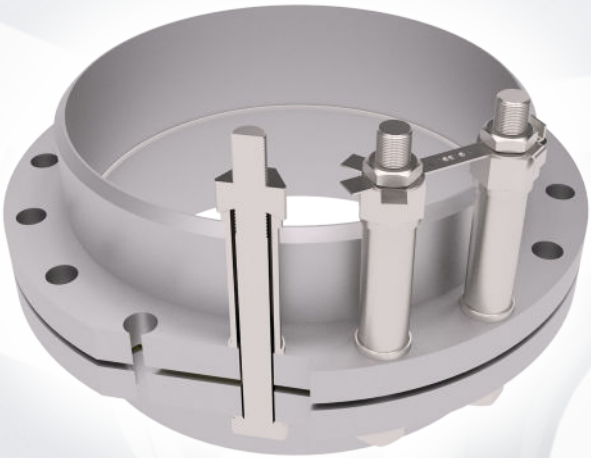


For structures like the gas turbine exhaust systems, the flange bolts will have a delayed thermal growth compared to the flange.

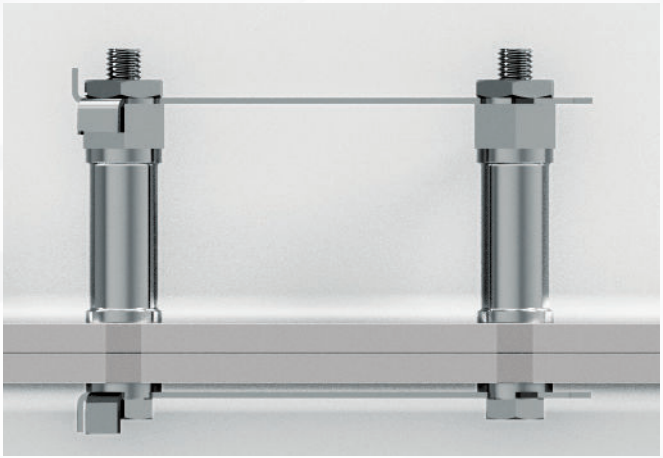
The temperature gradient will cause increased stress in the bolt.

Temperature gradients as low as 120 ° C may cause the bolt stretching to yield and permanent bolt relaxation.

Due to the unique design features of **HotBolt™**, the bolt connection will maintain pre-tension during heat cycles and temperature gradients. **HotBolt™** is self-aligning, and will not take damage when used on warped/deformed steel structures. This is of high importance if separation of duct flanges for gasket replacement is needed, due to relaxed bolts and related gasket damage.

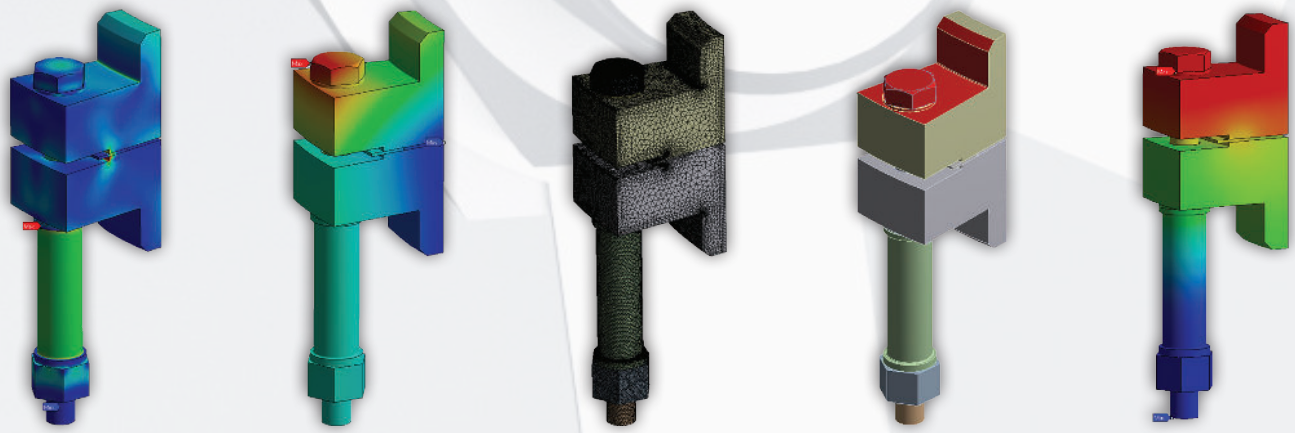


HotBolt™ is supplied for the Statoil Johan Sverdrup flare system.



HotBolt™ permanent thread locking

Included in the **HotBolt™** delivery is FEM-analyses and calculation of bolt pre-tensioning, securing that the bolt material will not yield when exposed to Thermal Strech.



Results from **HotBolt™** FEM-analyses complies with Eurocode 3 requirements. Analyses are based on real equipment heat cycles, like gas turbine start / stop cycle.

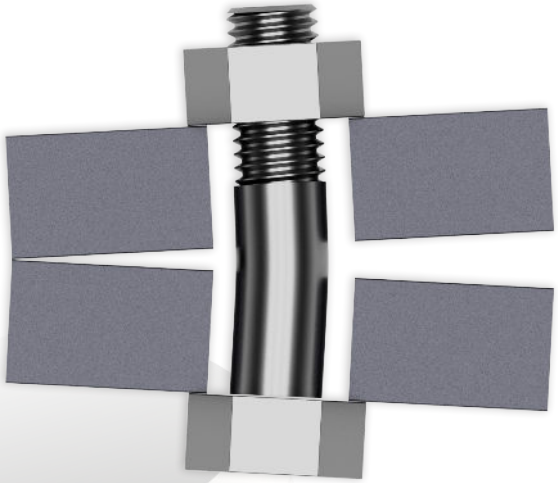
noble INSTALLATION AS

HotBolt™

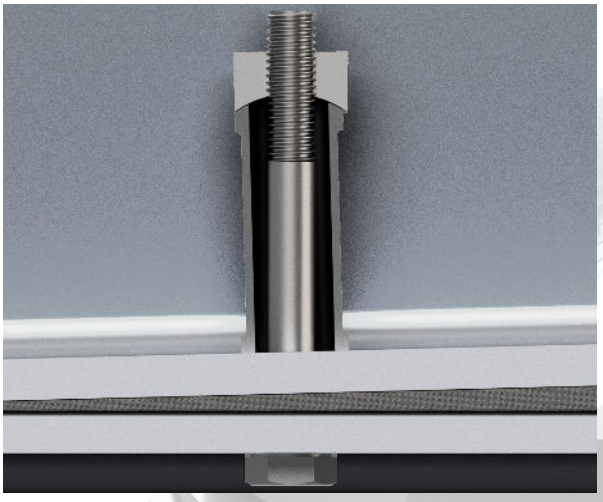
The optimal tension bolts for flare steel structure and flare system piping

- Due to steel structure warping, bolts may be exposed to related additional loads.
- Equipment located close to a flare is exposed to heat radiation.
- Flare heat radiation results in thermal growth of flanges, and stretching of flange bolts.

Warped duct flanges may cause bending and self-loosening of traditional bolts



Non-parallel and deformed flanges cause traditional bolts to bend and self-loosen.



HotBolt™ is self-aligning, and does not self-loosen due to warped and deformed flanges.



JQS

Joint Qualification System
for suppliers to the Oil Industry in Norway and Denmark

Certificate of Qualification

Awarded to
NOBLE INSTALLATION AS

Company Registration number: 991431012
Achilles Id: 29643

Achilles Information Centre hereby confirms that
NOBLE INSTALLATION AS
is Qualified in the Achilles Joint Qualification System for suppliers to the Oil Industry in Norway and Denmark. The Qualification concerns the product and service codes listed in the appendix.



Achilles JQS

Joint Qualification System
for suppliers to the Oil Industry in Norway and Denmark

Certificate of Qualification

Awarded to

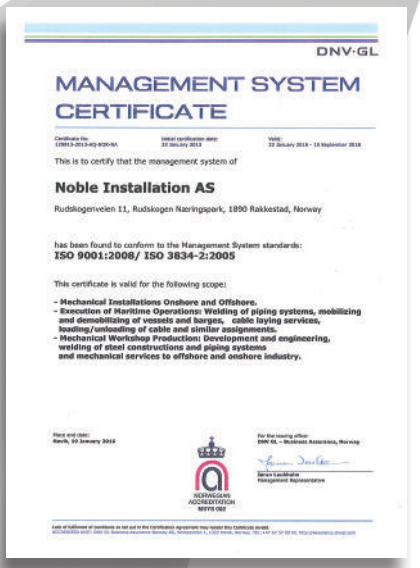
NOBLE INSTALLATION AS

Company Reg.no: 991431012

Achilles Id. 29643

Achilles Information Centre hereby confirms that
NOBLE INSTALLATION AS
is qualified in the Achilles Joint Qualification System
for suppliers to the Oil Industry in Norway and Denmark.
The qualification concerns the product and service
categories listed in the appendix.

Issued Date: 13-May-2015
Expiry Date: 22-Jan-2016



DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of

Noble Installation AS

Rudskogenveien 11, Rudskogen Næringspark, 1890 Rakkestad, Norway

has been found to conform to the Management System standards:
ISO 9001:2008/ ISO 3834-2:2005

This certificate is valid for the following scope:

- Mechanical Installations Onshore and Offshore.
- Execution of Maritime Operations: Welding of piping systems, mobilizing and demobilizing of vessels and barges, cable laying services, loading/unloading of cable and similar assignments.
- Mechanical Workshop Production: Development and engineering, welding of steel constructions and piping systems and mechanical services to offshore and onshore industry.

Noble Installation AS: Personnel with close to 50 years experience in gas turbine packaging.

Noble Installation AS

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