

# EMS FORCE® Nutlock TL-43

## ☆ General information

EMS FORCE® anaerobic adhesive and sealants are advanced materials with single component and solvent free feature. The products are specifically formulated for sealing, retaining, locking and bonding of metal or metal plated assemblies.

Anaerobic adhesives are stable when in contact with oxygen in air. As the product is placed between two mating metallic surfaces, where oxygen contact is vanished, polymerization starts and forms strong, vibration and pressure proof polymer layer.

## 📄 Product description

EMS FORCE® TL-43 is general purpose, medium-high strength thixotropic anaerobic threadlocker. The product cures when confined in the absence of air between close-fitting metal surfaces. Formulated to lock all metric and imperial nuts and bolts, preventing vibration loosening and leakage through the threads. TL-43 is slightly oil tolerant, so it will bond some 'as received' parts, but best results are obtained with clean substrates. The thixotropic nature of the product prevents run off, dripping and migration after assembly. TL-43 is typically used on mounting bolts, housing screws, etc. TL-43 prevents corrosion of assembled parts.

Main constituent	: Methacrylate ester
Appearance (uncured)	: Liquid
Colour	: Blue
Viscosity	: Medium and thixotropic
Strength	: Medium

## 🔪 Physical properties of uncured adhesive

Specific gravity Conditions: 22°C	: 1.030
Flash point Method: ASTM D56-05	: >93°C
Temperature range	: -50°C to 150°C
Corrosivity	: Non-corrosive
Gap filling	: up to 0.25mm
Viscosity Conditions: 22°C Method: ISO 2555 Apparatus: Brookfield RVT, spindle 3	: 4000 - 5000 cPs (@20 rpm)

## 🔒 Typical curing performance of adhesive

### ○ Curing time at room conditions

Various type of curing time of adhesive on several substrates are given as follows. Note that results can differ due to distance of bond gap and temperature.

Specimens	: M10x25 bolt and proper nut
Conditions	: 22°C

### Handling time

Material of specimen	Duration
Brass	<60 secs
Steel	5 to 7 mins
Stainless steel	6 to 8 mins
Zinc plated steel	5 to 10 mins
Aluminium	20 to 35 mins

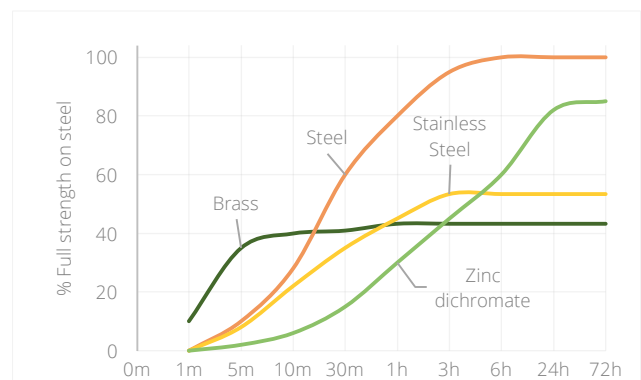
Average functional curing time: 1 to 3 hours

Average full curing time: 8 to 12 hours

### ○ Curing speed with different substrates

The curing rate of anaerobic adhesive greatly depends on type of surface material, substrate. The curing rate developed in time is determined by measuring breakaway torque of bolt and nut specimens. Test details and resultant graphs are given below.

Test method	: ISO 10964
Bolt and nut specs.	: M10x25
Conditions	: 22°C

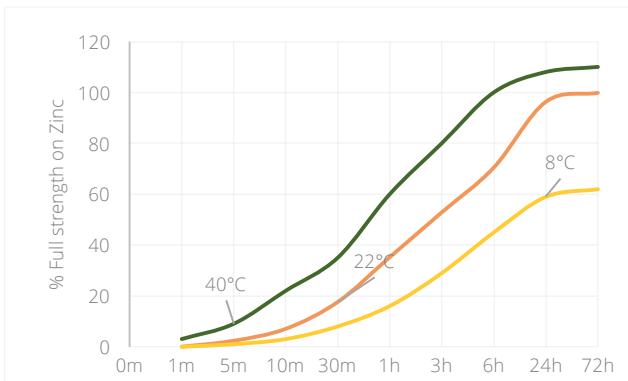


### ○ Curing speed at different temperatures

Temperature of medium has great impact on curing performance of anaerobic adhesive. The curing rate developed in time is determined by measuring breakaway torque of bolt and nut specimens. Test details and resultant graphs are given below.

Test method	: ISO 10964
Bolt and nut specs.	: M10x25
Conditions	: 22°C

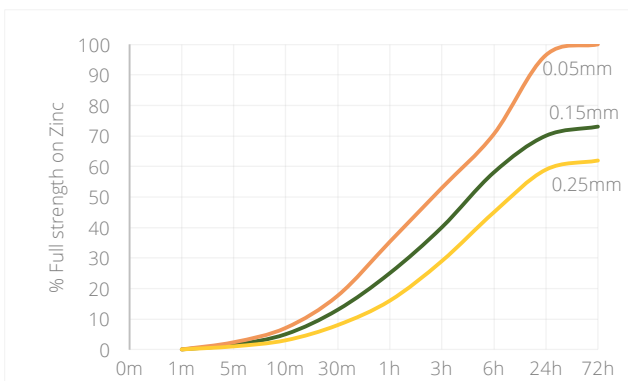
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o Curing speed with different bond gaps

Distance between two surfaces can significantly effect curing rate of adhesive. The curing rate developed in time is determined by measuring shear stress on the one surface of the specimen. Test details and resultant graphs are given below.

Test method	:	ISO 10123
Conditions	:	22°C



**Typical properties of cured adhesive**

Coefficient of thermal expansion ( $\alpha$ ) Method: ISO 11359-2	:	$6 \times 10^{-7} \text{ K}^{-1}$
Coefficient of thermal conductivity ( $k$ ) Method: ISO 8302	:	0.21 W/(m.K)
Specific heat Method: ISO 11357-4	:	0.22 kJ/(kg.K)

**Typical cured performance of adhesive**

Performance of cured anaerobic adhesive is examined and resultant torque values are given below.

Test method	:	ISO 10964
Conditions	:	22°C
Specimens	:	Different type of nuts and bolts

Unseated assembly cured for 24 hours

Type of specimen	Breakaway Torque ( $T_{BA}$ )	Prevailing Torque ( $T_p$ )
Zinc plated, M10	15 N.m	5 N.m

Zinc plated, M6	7 N.m	3 N.m
Stainless steel, M10	12 N.m	3 N.m
Stainless steel, M6	6 N.m	2 N.m

Preloaded (5N.m) assembly cured for 24 hours

Type of specimen	Breakloose Torque ( $T_{BL}$ )	Prevailing Torque ( $T_p$ )
Zinc plated, M10	18 N.m	6 N.m
Zinc plated, M6	10 N.m	3 N.m
Stainless steel, M10	14 N.m	4 N.m
Stainless steel, M6	8 N.m	3 N.m

Unseated assembly cured for 1 week

Type of specimen	Breakaway Torque ( $T_{BA}$ )	Prevailing Torque ( $T_p$ )
Zinc plated, M10	16 N.m	5 N.m
Zinc plated, M6	8 N.m	3 N.m
Stainless steel, M10	12 N.m	3 N.m
Stainless steel, M6	6 N.m	2 N.m



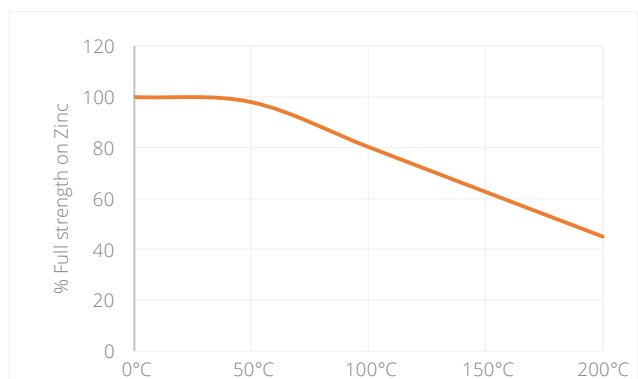
**Environmental resistance of cured adhesive**

Environmental resistance of cured adhesive is measured after curing by applying ISO 10964 preloaded assembly test at different conditions.

Test method	:	ISO 10964
Bolt and nut specs.	:	Zinc plated, M10x25
Curing condition and duration	:	22°C, 1 week
Torque test conditions (exception is hot strength test)	:	22°C
Torque type	:	Breakloose Torque ( $T_{BL}$ )

o Hot strength

Strength is examined at various temperatures. The reference value of '% Full strength on zinc plated' is taken from previous tables corresponding 24 hours curing.

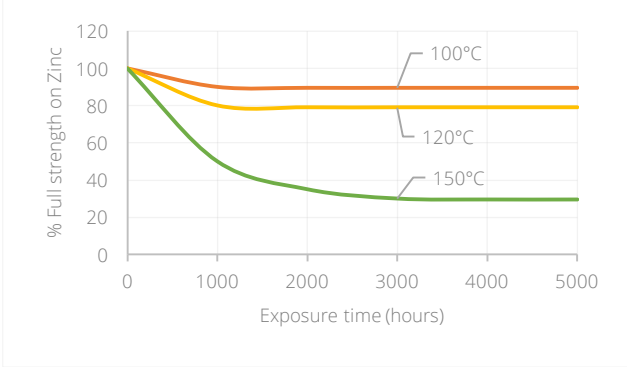


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### o Heat aging

Strength is examined on specimens that are aged at different temperatures. The reference value of '% Full strength on zinc plated' is taken from previous tables corresponding 24 hours curing.



### ☰ Directions for use

- Clean male and female threads before assembly with an absorbent tissue paper to remove any cutting oil.
- Apply the adhesive with a 360 turn to leading first three threads of the male and female fittings.
- Use an absorbent tissue paper to wipe off excess jointing compound in the direction of the thread.
- Assembly parts and hold on for 24 hours at 22-24°C to ensure full curing of jointing compound.
- For disassembly, use hand tools to remove mating parts. When it is hard to disassemble at room temperature, apply local heat until reaching 250°C and disassemble while hot. Then, remove any residual cured adhesive mechanically and clean parts with a proper solvent, acetone.

### 📦 Packaging

Bottles: 15, 50mL and 250mL  
Bulk: 1kg and 10kg

### 📦 Storage and shelf life

Keep product in its original container at 22°C and avoid to contact with direct sunlight. Storage below 5°C and above 30°C can negatively affect product properties.

Material removed from its original container can be contaminated during usage which affects both adhesive performance and storage life. Therefore, do not return contaminated product to the original container.

Metsan cannot take any responsibility for product which has been contaminated or stored under conditions different than previously indicated.

Shelf life: 24 months at 22°C

### 🏠 Health and safety

The product contains methacrylate esters.

For further information, please consult Safety Data Sheet (SDS) before use.

### ⚠ Disclaimer

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