

# Fluorescent Penetrant Testing System

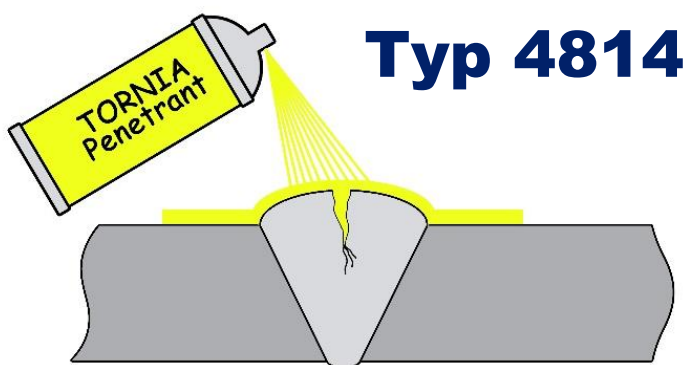
Complies with the requirements of EN ISO 3452:2014

## TORNIA TRES-CHECK PREMIUM

- **Typ 4814 Penetrant fluoreszierend**
- **436 Reiniger (remover)**
- **437 Entwickler (developer)**

**Highest sensitivity, reliable crack testing**

**Temperature range -10°C bis +50°C**



- **Surface crack testing**
- **Leak testing**

Subject to technical changes  
Tornesch April 2021



# Penetrant Testing

## TORNIA TRES-CHECK PREMIUM

### Application

Surface crack testing can only be performed effectively applying penetrant testing, where the material defects have connection to the surface and are free of oil or scale which would hinder the penetrant to penetrate. Therefore, to gain safe test results all kinds of contamination must be removed carefully.

This test system is also suitable for leak testing.

Penetrant testing enables easy detection of surface cracks regardless of the type and the direction of the defect, the material or the construction geometry.

### Maximum limit of water absorption

According to EN ISO 3452-2 minimum 5 % water may be added to the penetrant at a temperature of  $15 \pm 0.5$  °C without leading to turbidity, increase of viscosity or phase separation.

It could be proved that the above criteria do not appear when adding up to 35 % of water. No reduction of detection sensitivity takes place.

### Typical defect indications

- Cold cracks
- Hot cracks
- Grinding cracks
- Pores of different sizes
- Pore holes
- Stress crack corrosion
- Spongy texture
- Wrinkles
- Overlaps

### Application area

- Aircraft construction
- Automotive
- Railway industry
- Tank construction
- Engineering
- Boiler and heat exchanger construction
- Foundry
- Shipbuilding
- Welding technology
- Electrical engineering
- Metal processing
- Military

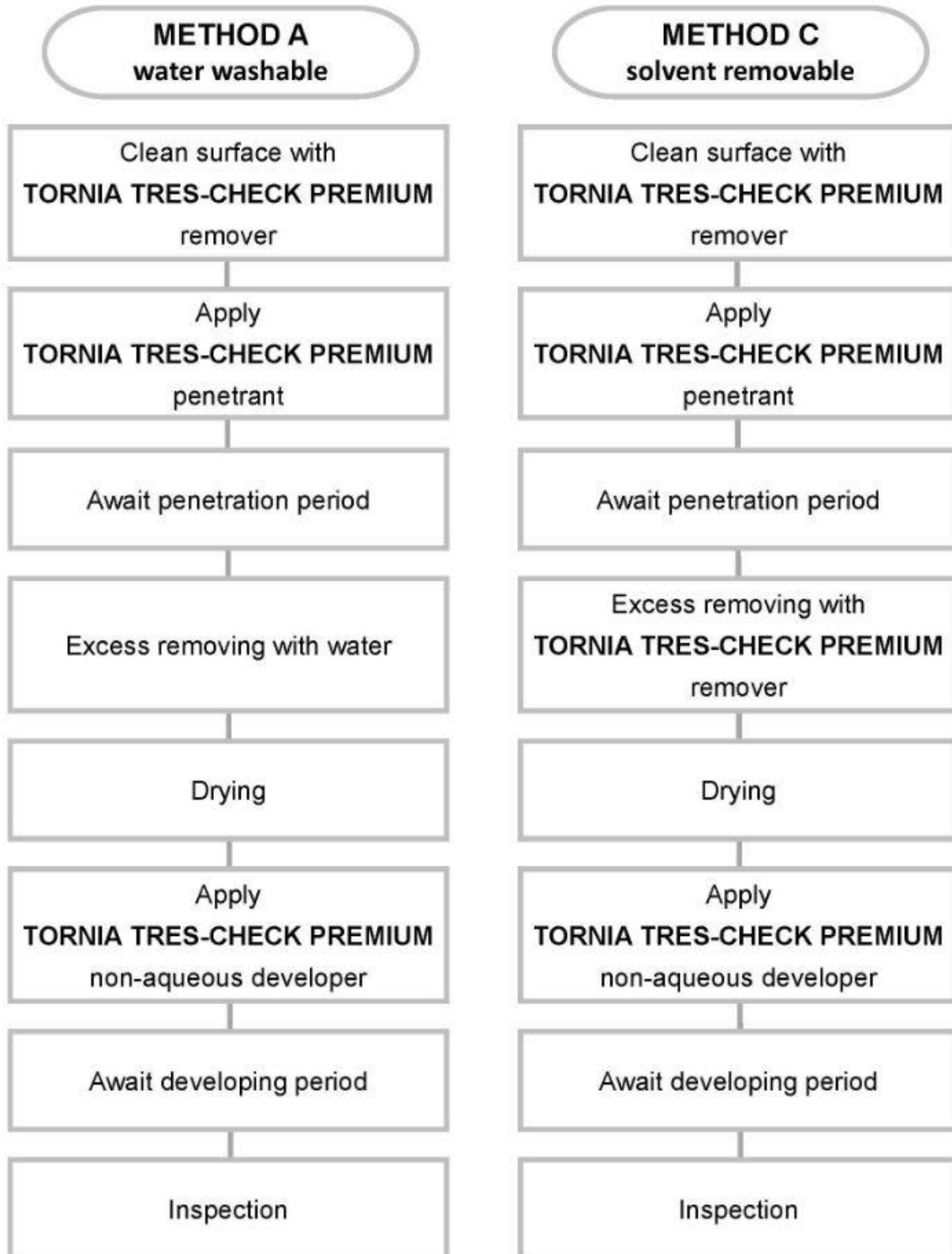
### Application for

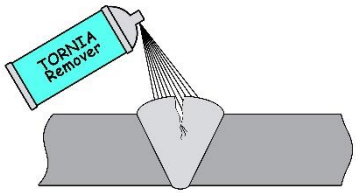
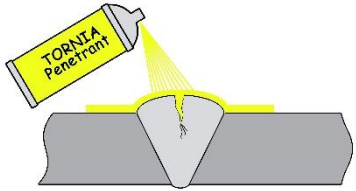
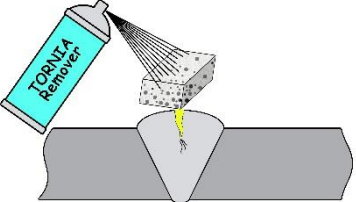
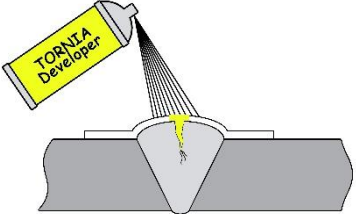
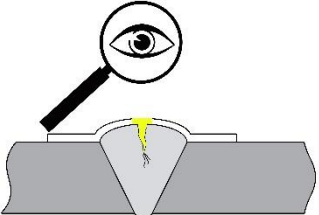
- Alloyed and unalloyed steels
- Claddings
- Weldings
- Steel and grey cast
- Malleable cast
- Steatit
- Plastics <sup>(1)</sup>
- Carbide
- Sinter metals
- Copper
- brass
- Ceramics <sup>(1)</sup>

<sup>(1)</sup> Test for suitability before use

# Method A&C

## Water and solvent washable



	<p><b>Precleaning</b></p> <p>Remove oil, grease and other contaminants from the surface of the area to be inspected.</p> <p>Application: remover <b>Typ 436 Reiniger</b> and clean lint-free cloth</p> <p>The surface must be fully dried before application of the penetrant.</p>
	<p><b>Penetration</b></p> <p>Apply the penetrant <b>Typ 4814 Penetrant fluoreszierend</b> evenly onto the cleaned and dry test area (spray, brush, pour, immerse).</p> <p>Shake well the aerosol before use.</p> <p>Application temperature: <b>-10 - +50 °C (14 - 122°F)</b></p> <p>Penetration time: 5 - 30 minutes</p>
	<p><b>Excess penetrant removal</b></p> <p>Remove excess penetrant from test area carefully with water or with cloth sprayed with remover <b>Typ 436 Reiniger</b>. Afterwards dry test area.</p> <p>Do not spray remover <b>Typ 436 Reiniger</b> directly onto the surface. This would affect the test sensitivity.</p> <p>Control of excess penetrant removal: Illuminance (visible light) &gt;350 lx.</p>
	<p><b>Developing</b></p> <p>Shake well aerosol before use.</p> <p>Spray developer <b>Typ 437 Entwickler</b> from a distance of 20-30 cm onto the test area to produce a very thin and even layer.</p> <p>The developer <b>Typ 437 Entwickler</b> absorbs the penetrant which remains in the defects and thereby intensifies the indication.</p> <p>Developing time: min. 10 minutes, max. 30 minutes</p>
	<p><b>Inspection</b></p> <p>First Inspektion directly after application of the developer. Further inspections acc. to the standard/specification.</p> <p>Final inspection after expiration of developing time.</p> <p>Illuminance (visible light) min. 500 lx.</p>

# TORNIA TRES-CHECK PREMIUM

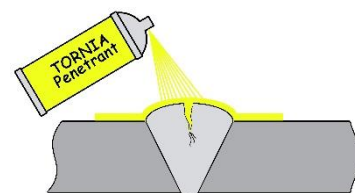
## Typ 4814 Penetrant fluoreszierend

**Type I**

**Method A & C**

**Sensitivity at -10°C - +50°C**

**→ Sensitivity level 4**



### TORNIA TRES-CHECK PREMIUM Typ 4814 Penetrant fluoreszierend

is a water or solvent-washable, almost odourless fluorescent penetrant.

Sensitivity level 4 (type I, method A and C).

Sulfur and halogen content: complies with the requirements of EN ISO 3452:2014.

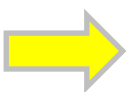
Also complies with the requirements of EN ISO 3452:2014, ASTM E-165 und ASTM D-516.

	<b>Typ 4814 Penetrant fluoreszierend (loose items)</b>	<b>Typ 4814 Penetrant fluoreszierend (aerosol)</b>
Colour	Light yellow - yellow	Light yellow - yellow
State of aggregation	Liquid	Aerosol
Odour	Characteristic	Characteristic
Sensitivity level		
Test product system IAa	4	4
Test product system ICd	4	4
Fluorescence brightness	111 %	Not determined
Thermal stability of fluorescence brightness	≥ 80%	Not determined
UV-A stability	≥ 70%	Not determined
Flash point (EN ISO 2719)	168°C (333.4°F)	Not determined
Viscosity (20°C)	43.70 mm <sup>2</sup> /s	Not determined
Density (20°C, DIN 51757)	0.9809 g/cm <sup>3</sup>	0.79 g/cm <sup>3</sup>
Water tolerance at 17°C (method A)	> 5%	Not determined
Sensitivity of Indications:		
30 µm	100 %	100 %
20 µm	100 %	100 %
10 µm	100 %	100 %
Shelf life	5 years	2 years

Corrosion		Elemental analysis	
Aluminium	none	Sulfur	0,001 wt %
Magnesium	none	Chloride	0,011 wt %
Carbon steel	none	Fluoride	0,005 wt %

Specifications	Delivery form		Art. no.
EN ISO 3452:2014	Aerosol	500 ml	GT01-481401
ASTM D-516	Container	1 L	GT01-481402
ASTM E-165	Container	10 L	GT01-481403
ASTM E-1417	Container	200 L	GT01-481404
ASTM E-1418			
AMS-2644			
ASME B&PV Code Section V			
MIL-I-25135E			
PMUC			
RCC-M			

Health / safety / shipping		
	Typ 4814 Penetrant Loose items	Typ 4814 Penetrant Aerosol
Contains no known Carcinogens	✓	✓
Avoid inhalation and/or repeated skin contact	✓	✓
Wearing of protective gloves and safety glasses is recommended	✓	✓
Never expose to temperatures above 43°C (110°F)	✓	✓
Storage class TRGS 510	10	2B
Do not store near oxidants	✓	✓
ADR/RID	UN 3082	UN 1950 (Pressure gas packs)
VOC Directive 2004/42/EG	--	53.94% (426.126 g/l)
Disposal according to official regulations	✓	✓
	✓	✓



For further information, see Safety Data Sheet of penetrant.

# TORNIA TRES-CHECK PREMIUM

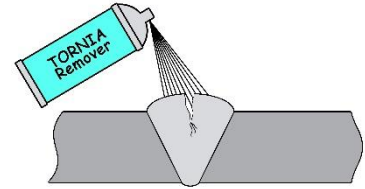
## Typ 436 Reiniger (remover)

Method C

(Excess penetrant remover solvent)

Class 2

Temperature range: -10°C up to +50° C



### TORNIA TRES-CHECK PREMIUM Typ 436 Reiniger

is a halogen-free, solvent-based (alcohol-based) remover.

**Typ 436 Reiniger** is used for removing penetrant and cleaning of surfaces to be tested in metal processing, welding, aircraft, railway and automobile industry, inspection of pipelines, refineries, chemical and nuclear power stations.

**Typ 436 Reiniger** complies with the requirements of penetrant testing acc. to EN ISO 3452 and ASTM E-165.

Since the remover evaporates without residue, it is suitable for titanium and high-nickel alloys.

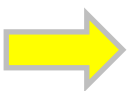
**Typ 436 Reiniger** is fast-drying, and therefore ideal for precleaning (removal of oil, grease and other contaminants), excess penetrant removal and postcleaning.

	Typ 436 Reiniger Loose items	Typ 436 Reiniger aerosol
Colour	Colourless	Colourless
State of aggregation	Liquid	Aerosol
Odour	Alcohol	Alcohol
Flash point (EN ISO 2719)	10°C (50°F)	Not determined
pH level	Neutral	Neutral
Vapour pressure (20°C)	Approx. 58 hPa	Not determined
Density (20°C, DIN 51757)	0.7890 g/cm <sup>3</sup>	0.784 – 0.786 g/cm <sup>3</sup>
Water solubility	Completely soluble	Completely soluble
Shelf life	5 years	4 years

Corrosion		Elemental analysis	
Aluminium	none	Sulfur	0.003 wt %
Magnesium	none	Chloride	< 0.001 wt %
Carbon steel	none	Fluoride	0.002 wt %

Specifications	Delivery form		Art. no.
EN ISO 3452:2014	Aerosol	500 ml	GT01-436001
ASTM D-516	Container	1 L	GT01-436002
ASTM E-165	Container	10 L	GT01-436003
	Container	200 L	GT01-436004

Health / safety / shipping			
	Typ 436 Reiniger Loose items	Typ 436 Reiniger Aerosol	
Contains no known Carcinogens	✓	✓	
Avoid inhalation and/or repeated skin contact	✓	✓	
Wearing of protective gloves and safety glasses is recommended	✓	✓	
Never expose to temperatures above 50°C (122°F)	✓	✓	
Storage class TRGS 510	3	2B	
Do not store near oxidants	✓	✓	
ADR/RID	UN 1170 (Ethanol)	UN 1950 (Pressure gas packs)	
VOC Directive 2004/42/EG	100 % (784 g/l)	100 % (784 g/l)	
Disposal according to official regulations	✓	✓	



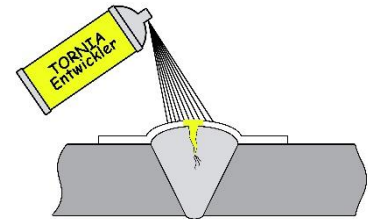
For further information, see Safety Data Sheet of remover.



# TORNIA TRES-CHECK PREMIUM

## Typ 437 Entwickler (developer)

**Form e and d**  
**(non-aqueous solvent-based wet developer)**



### TORNIA TRES-CHECK PREMIUM Typ 437 Entwickler

is a very fine-grained, non-aqueous, solvent-based wet developer for penetrant testing (type I), contrast colour penetrant testing (type II) and fluorescent contrast colour penetrant testing (type III).

**Typ 437 Entwickler** enables good detectability of indications. Therefore, the developer is ideally suitable for inspections which require detectability of finest indications.

**Typ 437 Entwickler** is sprayed onto the surface to be tested. The developer dries quickly and produces a thin uniform layer on the test area.

After inspection the dried developer can be removed from the test area with **Typ 436 Reinigers**.

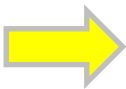
**Typ 437 Entwickler** complies with the requirements of penetrant testing acc. to EN ISO 3452 und ASTM E-165.

	<b>Typ 437 Entwickler Loose Ware</b>	<b>Typ 437 Entwickler Aerosol</b>
Colour	Whitish	White
State of aggregation	Liquid	Aerosol
Odour	Alcohol	Alcohol
Flash point (EN ISO 2719)	12 – 13 °C (ca. 55°F)	Not determined
Vapour pressure (20°C)	approx. 58 hPa	3,100 hPa
Density (20°C, DIN 51757)	approx. 0.790 g/cm <sup>3</sup>	0.66 g/cm <sup>3</sup>
Water solubility	Completely soluble	Partly soluble
Solvent content	--	20 - 25 %
Solid content	--	9.44 %
Evaporation residues / solids content	< 5 mg	< 5 mg
Shelf life	5 years	4 years

Corrosion		Elemental analysis	
Aluminium	none	Sulfur	0.017 wt %
Magnesium	none	Chloride	0.004 wt %
Carbon steel	none	Fluoride	0.010 wt %

Specifications	Delivery form		Art. no.
EN ISO 3452:2014	Aerosol	500 ml	GT01-437001
ASTM D-516	Container	1 L	GT01-437002
ASTM E-165	Container	10 L	GT01-437003
	Container	200 L	GT01-437004

Health / safety / shipping		
	Typ 437 Entwickler Lose Ware	Typ 437 Entwickler Spray
Contains no known Carcinogens	✓	✓
Avoid inhalation and/or repeated skin contact	✓	✓
Wearing of protective gloves and safety glasses is recommended	✓	✓
Never expose to temperatures above 50°C (122°F)	✓	✓
Storage class TRGS 510	3	2B
Do not store near oxidants	✓	✓
ADR/RID	UN 1170 (Ethanol)	UN 1950 (Pressure gas packs)
VOC-Richtlinie 2004/42/EG	--	90.63% (598.158 g/l)
Disposal according to official regulations	✓	✓



For further information, see Safety Data Sheet of developer.

Further products of the new generation

**TORNIA**



**[www.helling-group.com](http://www.helling-group.com)**

Subjekt to technical changes  
Tornesch April 2021