TECHNICAL DATA SHEET

# CHEMICAL ANCHOR HY

## Product description

ESSVE HY mortar is a 2-component reaction resin mortar based on a styrene-free Urethan-hybrid resin and will be delivered in a 2-component coaxial cartridge system. This high-performance product may be used in combination with a hand-, battery- or pneumatic tool and a static mixer. It was designed especially for the anchoring of threaded rods, reinforcing bars or internal threaded rod sleeves into concrete (also porous and light). Based on the excellent viscous behaviour the usability for overhead application is given. ESSVE HY is characterised, by a huge range of applications with an installation temperature from 0°C and an application temperature up to 160°C as well as by high chemical resistance for applications in extreme ambiences e.g. in swimming pools (chlorine) or in closeness to the sea (salt). The wide range of certificates, national and international approvals, allows nearly every application.



## Properties and benefits

- European Technical Assessment acc. to EAD 330499-00-0601 for use in cracked and uncracked concrete (Option 1): ETA-18/0615
- European Technical Assessment acc. to EAD 330499-00-0601 for Seismic categories C1 and C2
- European Assessment acc. to EAD 330087-00-0601 (post-installed rebar connection): ETA-18/0614
- US-approval acc. to AC 308 in concrete (ICC-ES): ESR-4011
- Certificated for drinking water applications acc. to NSF/ANSI Standard 61
- For heavy anchoring - doweling and post-installed rebar connection
- Fire resistance test report no. 21850
- Installation in water-filled bore holes (e.g. rain water)
- Overhead application
- Suitable for attachment points with small edge- and axial distances due to an anchoring free of expansion forces
- High chemical resistance
- Low odour
- High bending and pressure strength

## Applications samples

Suitable for the fixation of facades, roofs, wood constructions, metal constructions; metal profiles, columns, beams, consoles, railings, sanitary devices, cable trays, piping, post-installed rebar connection (reconstruction or reinforcement), etc.

## Handling and storage

- **Storage:** store in a cold and dark place, storage temperature: from +5°C up to +25 °C
- **Shelf life:** Minimum 3 months for coaxial cartridges
- Cartridge can be reused up to the end of the shelf life by replacing the static mixer or resealing cartridge with the sealing cap

# Applications and intended use

**Base material:**
Cracked and non-cracked concrete, light-concrete, porous-concrete, natural stone (Attention! natural stone, can discolour; shall be checked in advance)

**Anchor elements:**
Threaded rods (zinc plated or hot dip, stainless steel and high corrosion resistance steel), reinforcing bars, internal threaded rods, profiled rod, steel section with undercuts (e.g. perforated section)

**Temperature range:**

- Base material installation temperature 0°C up to +40°C cartridge temperature min. +5°C; optimal +20°C
- Base material temperature -40°C to +160°C after full curing

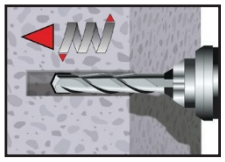
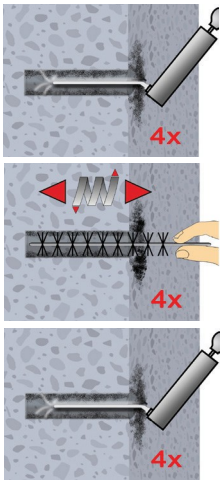
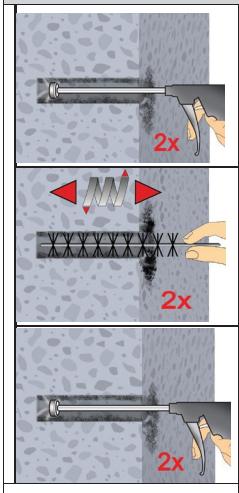
# Mortar properties

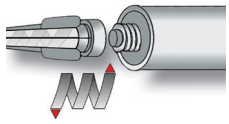
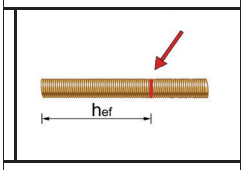
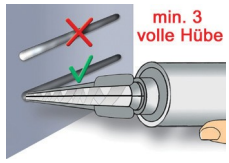
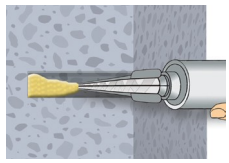
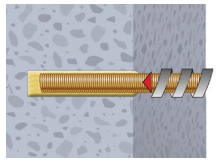
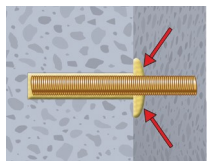
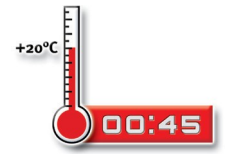
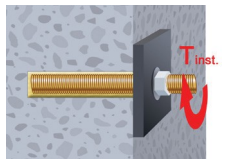
| Properties | Test Method | Result |
|---|---|---|
| UV resistance | | Pass |
| Watertightness | EN 12390-8 | 0 mm |
| Temperature stability | | ≤ 160°C |
| Density | | 1,78 kg / dm³ |
| Compressive strength | EN 196-1 | 122 N / mm² |
| Tensile strength | EN ISO 527-2 | 14,9 N / mm² |
| Flexural strength | EN 196-1 | 22,2 N / mm² |
| E modulus | EN ISO 527-2 | 8300 N / mm² |
| Shrinkage | 52450 | < 0,2 % |
| Hardness Shore A | EN ISO 868 | 97,6 |
| Electrical resistance | IEC 93 | 7,2 x $10^{13}$ $\Omega$ m |
| Thermal conductivity | EN 993-15 | 1,06 W/m·K |
| Thermal heat capacity | EN 993-15 | 1.090 J/kg·K |

# Curing time

| Temperature of base material | | | Gelling- and working time | Full curing time in dry base material | Full curing time in wet base material |
|---|---|---|---|---|---|
| 0 °C | to | +4 °C | 25 Min. | 210 Min. | 420 Min. |
| +5 °C | to | +9 °C | 15 Min. | 120 Min. | 240 Min. |
| +10 °C | to | +19 °C | 10 Min. | 60 Min. | 120 Min. |
| +20 °C | to | +29 °C | 6 Min. | 40 Min. | 80 Min. |
| +30 °C | to | +34 °C | 3 Min. | 30 Min. | 60 Min. |
| +35 °C | to | +39 °C | 2 Min. | 30 Min. | 60 Min. |
| +40 °C | | | 2 Min. | 30 Min. | 60 Min. |

# Usage instructions – concrete

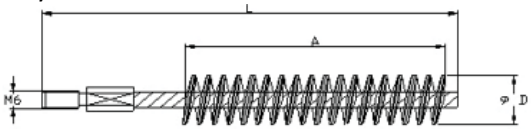
| | |
|---|---|
|  | 1. Drill with hammer drill mode a hole into the base material to the size and embedment depth required by the selected anchor. |
| MAC: Cleaning for borehole diameter $d_0 \leq 20$ mm and bore hole depth $h_0 \leq 10d_s$ (uncracked concrete only!) | |
|   | 2a. Starting from the bottom or the back of the bore hole, blow the hole clean by a hand pump (see page 6) a minimum of four times<br>2b. Check the brush diameter (page 6). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (see page 6) a minimum of four times in a twisting motion. If the borehole ground is not reached with the brush, a brush extension must be used.<br>2c. Finally blow the hole clean again with a hand pump a minimum of four times. |
| CAC: Cleaning for all borehole diameter in uncracked and cracked concrete | |
|   | 2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used.<br>2b. Check the brush diameter (page 6). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (see page 6) a minimum of two times in a twisting motion. If the borehole ground is not reached with the brush, a brush extension must be used.<br>2c. Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of two times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used. |
| | After cleaning, the bore hole has to be protected against re-contamination in an appropriate way, until dispending the mortar in the bore hole. If necessary, the cleaning has to be repeated directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again. |

| | |
|---|---|
|  | 3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. After every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used. |
|  | 4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods. |
|  | 5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour. |
|  | 6. Starting from the bottom resp. back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw of the static mixing nozzle as the hole is filled avoids creating air pockets. For embedments larger than 190mm an extension nozzle shall be used. For overhead and horizontal installation in bore holes bigger than 20mm resp. deeper than 240mm a piston plug shall be used. Observe the gel-/ working times given. |
|  | 7. Push the threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. The anchor should be free of dirt, grease, oil or other foreign material. |
|  | 8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. |
|  | 9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured. |
|  | 10. After full curing, the add-on part can be installed with the max. torque by using a calibrated torque wrench. |

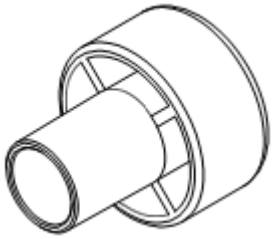
# Cleaning of the drill hole – concrete

MAC - Hand pump (volume 750 ml)
Drill bit diameter (d0); 10 mm to 20 mm
Drill hole depth (h0) < 10 ds
Only uncracked concrete

CAC - compressed air tool (min. 6 bar)
Drill bit diameter (d0): all diameters




Steel brush
Drill bit diameter (d0): all diameters



Piston plug for overhead or horizontal installation
Drill bit diameter (d0): 18 mm to 40 mm

| Threaded rod | Rebar | Internal Threaded Rod | Bore hole-∅ | Brush-∅ | | Min. brush-∅ | Piston plug |
|---|---|---|---|---|---|---|---|
| (mm) | (mm) | (mm) | (mm) | | $d_b$ (mm) | $d_{b,min}$ (mm) | (Nr.) |
| M 8 | | | 10,0 | RB 10 | 11,5 | 10,5 | not necessary |
| M 10 | 8 | IG-M6 | 12,0 | RB 12 | 13,5 | 12,5 | |
| M 12 | 10 | IG-M8 | 14,0 | RB 14 | 15,5 | 14,5 | |
| | 12 | | 16,0 | RB 16 | 17,5 | 16,5 | |
| M 16 | 14 | IG-M10 | 18,0 | RB 18 | 20,0 | 18,5 | VS 18 |
| | 16 | | 20,0 | RB 20 | 22,0 | 20,5 | VS 20 |
| M 20 | | IG-M12 | 22,0 | RB 22 | 24,0 | 22,5 | VS 22 |
| | 20 | | 25,0 | RB 25 | 27,0 | 25,5 | VS 25 |
| M 24 | | IG-M16 | 28,0 | RB 28 | 30,0 | 28,5 | VS 28 |
| M 27 | | | 30,0 | RB 30 | 31,8 | 30,5 | VS 30 |
| | 25 | | 32,0 | RB 32 | 34,0 | 32,5 | VS 32 |
| M 30 | 28 | IG-M20 | 35,0 | RB 25 | 37,0 | 35,5 | VS 35 |
| | 32 | | 40,0 | RB 40 | 43,5 | 40,5 | VS 38 |

# Performance data – concrete
# Threaded rod

All data is based on Technical Assessment ETA 18/0615 (published 2018-09-04) and applies for:

- Correct installation according to ETA
- No edge distance and spacing influence. It's advised to use our calculation software ESSVE CS for more complicated design situations
- One typical embedment depth, as specified in the table. Including the minimum base material thickness dependant on this embedment depth
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²
- Temperature range I (min. base material temp. -40°C, max. long/short term base material temp.: +24°C/40°C)
- Steel failure mode is denoted with *underline italics*
- Undersized hot dip galvanized threaded rods (e.g. 5.8U and 8.8U) have a reduced stress area in accordance with ISO 10684 Annex A. This lowers the steel capacity for M8 and M10, larger sizes are not affected
- The Design Resistance includes the partial safety factor for material $\gamma_M$ and optimal installation safety factor ($\gamma_{inst}$), (e.g. dry/wet concrete rather than water-filled hole)
- The Recommended Loads use an overall partial safety factor for action $\gamma$ = 1.4, which is an approximation of Eurocode EN 1990

# Performance data – concrete
# Threaded rod

**ESSVE HY - Typical embedment depth**

| | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Effective embedment depth, $h_{ef}$ | [mm] | 80 | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| Minimum concrete thickness, $h_{min}$ | [mm] | 110 | 120 | 140 | 161 | 214 | 266 | 300 | 340 |

**ESSVE HY - Characteristic resistance, uncracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{Rk}$ | [kN] | 5.8 | *18.0* | *29.0* | *42.0* | 70.6 | 111.9 | 153.7 | 187.8 | 224.0 |
| | | 8.8 | *29.0* | 43.1 | 58.3 | 70.6 | 111.9 | 153.7 | 187.8 | 224.0 |
| | | A4-70 | *26.0* | *41.0* | *59.0* | 70.6 | 111.9 | 153.7 | - | - |
| | | HDG 5.8U | *17.0* | *27.0* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *27.0* | *43.0* | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{Rk}$ | [kN] | 5.8 | *9.0* | *15.0* | *21.0* | *39.0* | *61.0* | *88.0* | *115.0* | *140.0* |
| | | 8.8 | *15.0* | *23.0* | *34.0* | *63.0* | *98.0* | *141.0* | *184.0* | *224.0* |
| | | A4-70 | *13.0* | *20.0* | *30.0* | *55.0* | *86.0* | *124.0* | - | - |
| | | HDG 5.8U | *8.0* | *13.0* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *14.0* | *22.0* | Same as for 8.8 | | | | | |

**ESSVE HY - Characteristic resistance, cracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{Rk}$ | [kN] | 5.8 | 14.1 | 21.2 | 33.2 | 50.3 | 79.8 | 109.6 | 133.9 | 159.7 |
| | | 8.8 | 14.1 | 21.2 | 33.2 | 50.3 | 79.8 | 109.6 | 133.9 | 159.7 |
| | | A4-70 | 14.1 | 21.2 | 33.2 | 50.3 | 79.8 | 109.6 | - | - |
| | | HDG 5.8U | 14.1 | 21.2 | Same as for 5.8 | | | | | |
| | | HDG 8.8U | 14.1 | 21.2 | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{Rk}$ | [kN] | 5.8 | *9.0* | *15.0* | *21.0* | *39.0* | *61.0* | *88.0* | *115.0* | *140.0* |
| | | 8.8 | *15.0* | *23.0* | *34.0* | *63.0* | *98.0* | *141.0* | *184.0* | *224.0* |
| | | A4-70 | *13.0* | *20.0* | *30.0* | *55.0* | *86.0* | *124.0* | - | - |
| | | HDG 5.8U | *8.0* | *13.0* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *14.0* | *22.0* | Same as for 8.8 | | | | | |

# Performance data – concrete
# Threaded rod

**ESSVE HY - Typical embedment depth**

| | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Effective embedment depth, $h_{ef}$ | [mm] | 80 | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| Minimum concrete thickness, $h_{min}$ | [mm] | 110 | 120 | 140 | 161 | 214 | 266 | 300 | 340 |

**ESSVE HY - Design resistance, uncracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{Rd}$ | [kN] | 5.8 | *12.0* | *19.3* | *28.0* | 47.1 | 74.6 | 102.5 | 125.2 | 149.4 |
| | | 8.8 | *19.3* | 28.7 | 38.8 | 47.1 | 74.6 | 102.5 | 125.2 | 149.4 |
| | | A4-70 | *13.9* | *21.9* | *31.6* | 47.1 | 74.6 | 102.5 | - | - |
| | | HDG 5.8U | *11.3* | *18.0* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *18.0* | *28.7* | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{Rd}$ | [kN] | 5.8 | *7.2* | *12.0* | *16.8* | *31.2* | *48.8* | *70.4* | *92.0* | *112.0* |
| | | 8.8 | *12.0* | *18.4* | *27.2* | *50.4* | *78.4* | *112.8* | *147.2* | *179.2* |
| | | A4-70 | *8.3* | *12.8* | *19.2* | *35.3* | *55.1* | *79.5* | - | - |
| | | HDG 5.8U | *6.4* | *10.4* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *11.2* | *17.6* | Same as for 8.8 | | | | | |

**ESSVE HY - Design resistance, cracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{Rd}$ | [kN] | 5.8 | 9.4 | 14.1 | 22.1 | 33.5 | 53.2 | 73.0 | 89.2 | 106.5 |
| | | 8.8 | 9.4 | 14.1 | 22.1 | 33.5 | 53.2 | 73.0 | 89.2 | 106.5 |
| | | A4-70 | 9.4 | 14.1 | 22.1 | 33.5 | 53.2 | 73.0 | - | - |
| | | HDG 5.8U | 9.4 | 14.1 | Same as for 5.8 | | | | | |
| | | HDG 8.8U | 9.4 | 14.1 | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{Rd}$ | [kN] | 5.8 | *7.2* | *12.0* | *16.8* | *31.2* | *48.8* | *70.4* | *92.0* | *112.0* |
| | | 8.8 | *12.0* | *18.4* | *27.2* | *50.4* | *78.4* | *112.8* | *147.2* | *179.2* |
| | | A4-70 | *8.3* | *12.8* | *19.2* | *35.3* | *55.1* | *79.5* | - | - |
| | | HDG 5.8U | *6.4* | *10.4* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *11.2* | *17.6* | Same as for 8.8 | | | | | |

# Performance data – concrete
# Threaded rod

**ESSVE HY - Typical embedment depth**

| | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Effective embedment depth, $h_{ef}$ | [mm] | 80 | 90 | 110 | 125 | 170 | 210 | 240 | 270 |
| Minimum concrete thickness, $h_{min}$ | [mm] | 110 | 120 | 140 | 161 | 214 | 266 | 300 | 340 |

**ESSVE HY - Recommended loads, uncracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{rec}$ | [kg] | 5.8 | *870* | *1405* | *2035* | 3425 | 5435 | 7460 | 9115 | 10875 |
| | | 8.8 | *1405* | 2090 | 2825 | 3425 | 5435 | 7460 | 9115 | 10875 |
| | | A4-70 | *1010* | *1595* | *2295* | 3425 | 5435 | 7460 | - | - |
| | | HDG 5.8U | *825* | *1310* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *1310* | *2085* | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{rec}$ | [kg] | 5.8 | *520* | *870* | *1220* | *2270* | *3550* | *5125* | *6700* | *8155* |
| | | 8.8 | *870* | *1340* | *1980* | *3670* | *5710* | *8215* | *10720* | *13050* |
| | | A4-70 | *605* | *930* | *1400* | *2565* | *4015* | *5785* | - | - |
| | | HDG 5.8U | *465* | *755* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *815* | *1280* | Same as for 8.8 | | | | | |

**ESSVE HY - Recommended loads, cracked concrete, typical embedment depth**

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Tension $N_{rec}$ | [kg] | 5.8 | 680 | 1025 | 1610 | 2440 | 3870 | 5315 | 6495 | 7755 |
| | | 8.8 | 680 | 1025 | 1610 | 2440 | 3870 | 5315 | 6495 | 7755 |
| | | A4-70 | 680 | 1025 | 1610 | 2440 | 3870 | 5315 | - | - |
| | | HDG 5.8U | 680 | 1025 | Same as for 5.8 | | | | | |
| | | HDG 8.8U | 680 | 1025 | Same as for 8.8 | | | | | |

| | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shear $V_{rec}$ | [kg] | 5.8 | *520* | *870* | *1220* | *2270* | *3550* | *5125* | *6700* | *8155* |
| | | 8.8 | *870* | *1340* | *1980* | *3670* | *5710* | *8215* | *10720* | *13050* |
| | | A4-70 | *605* | *930* | *1400* | *2565* | *4015* | *5785* | - | - |
| | | HDG 5.8U | *465* | *755* | Same as for 5.8 | | | | | |
| | | HDG 8.8U | *815* | *1280* | Same as for 8.8 | | | | | |

# Chemical resistance

| Chemical Agent | Concentration | Resistant | Not Resistant |
|---|---|---|---|
| Acetic acid | 10 | ✓ | |
| Acetone | 100 | | ✓ |
| Ammonia, aqueous solution | 5 | ✓ | |
| Benzyl Alcohol | 100 | | ✓ |
| Chlorinated lime | 10 | ✓ | |
| Citric acid | 10 | ✓ | |
| Chlorine water, swimming pool | all | ✓ | |
| Demineralized Water | 100 | ✓ | |
| Diesel oil | 100 | ✓ | |
| Ethanol | 100 | | ✓ |
| Ethyl Acetate | 100 | | ✓ |
| Formic acid | 100 | | ✓ |
| Fuel Oil | 100 | ✓ | |
| Gasoline (premium grade) | 100 | ✓ | |
| Glycol (Ethylene glycol) | 100 | | ✓ |
| Hydraulic fluid | 100 | ✓ | |
| Hydrogen peroxide | 10 | | ✓ |
| Isopropyl alcohol | 100 | | ✓ |
| Lactic acid | 10 | ✓ | |
| Linseed oil | 100 | ✓ | |
| Lubricating oil | 100 | ✓ | |
| Nitric acid | 10 | | ✓ |
| Methanol | 100 | | ✓ |
| Phosphoric acid | 10 | ✓ | |
| Potassium Hydroxide ph 13.2 | 100 | ✓ | |
| Salt (Calcium Chloride) | 100 | ✓ | |
| Sea water, salty | 100 | ✓ | |
| Sodium carbonate | 10 | ✓ | |
| Sulfuric acid | 10 | ✓ | |

Results shown in the table are applicable to brief periods of chemical contact with full cured adhesive (e.g. temporary contact with adhesive during a spill).