Material specifications
Material selection and specifications

ABB offers Ty-Rap cable ties and accessories in a wide variety of materials, each suitable for specific environmental conditions.

The purpose of this document is to help you choose the best material for your particular application. The effects of climate, flames, chemicals, temperature extremes and radiation on the different materials are clearly shown in the following tables to simplify the process.

Once you've determined which material is best for you, you can choose from the wide variety of Ty-Rap cable ties, ID ties, mounting bases, tie-down straps, and more, offered by ABB.

How to use Table 1

Table 1 simplifies the selection process by giving the relative performance ratings of materials offered by ABB.
For example, if your application is in an extremely cold environment, 4 materials will meet your needs: fluoropolymer, polyamide 12, Halar® * and stainless steel. Then the cost may be your next most important criterion. Of these 4 options, polyamide 12 would be the most cost effective. However, if the tensile strength is important, then stainless steel would be the best choice.

Refer to Tables 2 and 3 (pages C140-C142) for more detailed information regarding the physical properties of the materials and the chemical resistance of the materials, respectively.

There is a number of factors to be considered when choosing the proper materials for a specific environment. It is extremely difficult to provide data on all the possible combinations or conditions that can occur and therefore, it is recommended that this information be used as a guideline and that cable tie samples be tested in the intended application, by the user, to determine suitability.

* Halar® is a registered trademark of Solvay Solexis, inc.

Table 1

	Materials available									
	Polyamide 6.6 Natural	**Polyamide 6.6 weather resistant**	**Polyamide 6.6 Natural heat stabilised**	**Polyamide 6.6 flame retardant**	**Polyamide 12 weather resistant**	**Poly-propylene weather resistant**	**Fluoro-polymer**	**Halar®**	**Stainless steel**	**Toughened weatherable acetal**
UV resistant	1	4	1	1	4	4	5	5	5	4
Radiation resistant	1	1	1	1	1	1	4	4	5	1
Flexible at low temperatures	3	3	3	2	4	3	4	4	5	4
Flexible at high temperatures	3	3	4	3	2	2	4	4	5	2
Flame retardant	3	3	3	4	1	1	4	4	5	1
Tensile strength	3	3	3	3	2	1	3	3	5	2
Relative cost	Low	Low	Low	Medium	Medium	Low	High	High	High	High
Résistance chimique	See table 3									

1 = Less suitable
5 = More suitable

Material selection ordering guide

Physical properties of cable tie materials

Table 2

		Polyamide 6.6 Natural	Polyamide 6.6 weather resistant	Polyamide 6.6 Natural heat stabilised	Polyamide 6.6 flame retardant	Polyamide 12 weather resistant	Poly-propylene weather resistant	Fluoro-polymer radiation resistant	Fluoro-polymer ECTFE	Stainless steel
Physical properties of Ty-Rap cable tie materials										
Tensile strength (Yield) @ 23°C (Dry-As-Molded) [1]	psi	12 000	12 000	12 000	11,000	7 500	4 600	6 700	6 600	90 000
Flammability Rating	–	UL 94 V-2	UL 94 V-2	UL 94 V-2	UL 94 V-0	–	–	UL 94 V-0	UL 94 V-0	–
Radiation Resistance	rads	1 x 105	1 x 105	1 x 105	1 x 105	1 x 105	1 x 105	2 x 108	2 x 108	2 x 108
UV Resistance	–	Poor	Good	Poor	Poor	Good	Good	Excellent	Excellent	Excellent
Water Absorption (24 hrs)	%	1,3	1,2	1,4	1,4	0,25	0,1	<,01	<,01	None
Oxygen Index	–	28	28	31	34	–	–	30	52	–
Max. continuous use temp.	°C/°F	85 / 185	85 / 185	105 / 221	65 / 149	85 / 185	85 / 185	150 / 302	160 / 320	537 / 1000
Min. continuous use temp.	°C/°F	-60 / -76	-60 / -76	-60 / -76	-20 / -4	-40 / -40	-40 / -40	-60 / -76	-46 / -50	-80 / -112
Colour	–	Natural	Black	Green tint	White	Black	Black	Aqua	Maroon	Stainless

[1] ASTM D638-878 except stainless steel which is ASTME8

Stainless steel cable ties

Specification

AISI type name or number			**201**		**201 ¼ hard**		**301**
	UNS designation		**S20100**		**S20100**		**S30100**
Specification	**ASTM**		**A-666**		**A-666**		**A-666**
% of the main alloying elements		C	0.15 Max.	C	0.03 Max	C	0.15 Max.
		Mn	5.50 - 7.50	Mn	5.50 - 7.50	Mn	2.00 Max.
		Si	0.75 Max	Si	1.00 Max	Si	1.00 Max
		Cr	16.00 - 18.00	Cr	16.00 - 18.00	Cr	16.00 - 18.00
		Ni	3.50 - 5.50	Ni	3.50 - 5.50	Ni	6.00 - 8.00
		N	0.25 Max	N	0.25 Max		
Physical properties							
Density , lb/in.^{3}			0.28		0.28		0.29
Mod. elasticity in tension x 106 PSI			28.0		28.6		28.0
Structure			Austenitic		Austenitic		Austenitic
Average coefficient of thermal expansion by °F x 10-6	32 - 212°F		8.7		9.0		9.4
	32 - 600°F		9.7		10.0		9.5
	32 - 1000°F		10.2		10.5		10.1
	32 - 1200°F		10.5		–		10.4
Melting interval			2,550 - 2,650°F		2,550 - 2,650°F		2,550 - 2,590°F
Electrical properties			Non magnetic		Non magnetic		Non magnetic
Magnetic permeability, annealing			μ = 1.02		μ = 1.02		μ = 1.02
Electrical resistivity, microhm - cm, 70° F			69.00		69.00		72.00
Mechanical properties							
Rockwell hardness			90 - 95R_B		20 - 30R_B		75 - 95R_B
Tensile strength -spec. min. of BAND-IT (PSI) and typical (PSI)			100,000		120,000		100,000
			115,000		135,000		105,000
Yield strength - spec. min. by BAND-IT (PSI) and typical (PSI)			45,000		85,000		45,000
			45,000		90,000		55,000
% elongation per 2in. spec. min. of BAND-IT (PSI) and typical (PSI)			40		40		40
			55		45		50
Tensile strength at	1,300°F		37,500		37,500		35,500
High temperature	1,500°F		23,000		23,000		22,500
Short term tests (PSI)	1,700°F		11,000		11,000		11,000
Corrosion resistance							
Normal atmosphere and fresh water			Good		Good		Good
Industrial atmosphere			Good		Good		Good
Marine atmosphere			Middling		Middling		Middling
Salt water			No		No		No
Mild chemicals			Middling		Middling		Middling
Oxidizing chemicals			Middling		Middling		Middling
Reducing chemicals			No		No		No

All values in this table are for reference only.

Material specificiations

Flammability rating UL

Flammability ratings UL
Note: These tests for flammability of plastic material are intended to serve as a preliminary indication of acceptability with respect to flammability for particular applications.

UL 94 vertical burn test procedures
Test specimens of the material, with dimensions 127 mm x 12,7 mm (5 in. x ½ in.) with the thickness intended for use in the end product, are tested in both the manufactured condition and in the aged state. The test requires that the specimen be supported in a vertical fixture and a precisely controlled flame applied for a 10 second period. The flame is removed and the duration of flaming is noted. If the flame extinguishes, a second exposure to flame for 10 seconds is applied and duration of flaming is again noted. It is observed and recorded whether or not test specimens drip flaming particles that ignite a cotton swatch.

Materials classed V-0:
A material classed V-0 shall:
A. Not have any specimens that burn with flaming combustion for more than 10 seconds after either application of the test flame.
B. Not have a total flaming combustion time exceeding 50 seconds for the 10 flame applications for each set of five specimens.
C. Not have any specimens that burn with flaming or glowing combustion up to the holding fixture.
D. Not have any specimens that drip flaming particles that ignite the dry absorbent surgical cotton located 12 in. below the test specimen.
E. Not have any specimens with glowing combustion that persists for more than 30 seconds after the second removal of the test flame.

Materials classed V-1:
A material classed V-1 shall:
A. Not have any specimens that burn with flaming combustion for more than 30 seconds after either application of the test flame.
B. Not have a total flaming combustion time exceeding 250 seconds for the 10 flame applications for each set of five specimens.
C. Not have any specimens that burn with flaming or glowing combustion up to the holding fixture.
D. Not have any specimens that drip flaming particles that ignite the dry absorbent surgical cotton located 12 in. below the test specimen.
E. Not have any specimens with glowing combustion that persists formore than 60 seconds after the second removal of the test flame.

Materials classed V-2:
A material classed V-2 shall:
A. Not have any specimens that burn with flaming combustion for more than 30 seconds after either application of the test flame.
B. Not have a total flaming combustion time exceeding 250 seconds for the 10 flame applications for each set of five specimens.
C. Not have any specimens that burn with flaming or glowing combustion up to the holding fixture.
D. Be permitted to have specimens that drip flaming particles that burn only briefly, some of which ignite the dry absorbent surgical cotton placed 12 in. below the test specimen.
E. Not have any specimens with glowing combustion that persists for more than 60 seconds after the second removal of the test flame.

UL 94 horizontal burn (HB) test procedures
The test uses a ½ inch x 5 inches (12.7mm x 127mm) specimen held at one end in a horizontal position with marks at 1 inch (25.4mm) and 5 inches (127mm) from the free end. A flame is applied to the free end for 30 seconds or until the flame front reaches the 1 inch (25.4mm) mark. If combustion continues the duration is timed between the 1 inch (25.4mm) mark and the 5 inch (127mm) mark. If combustion stops before the 5 inch (127mm) mark, the time of combustion and the damaged length between the two marks are recorded. A set of three specimens are tested.

Materials classed 94 HB
A material that is less than 0.118 inch (3mm) in thickness will be classified 94HB if it has a burning rate of less than 3 inches (76.2mm) per minute or stops burning before the 5 inches (127mm) mark. If one specimen from the set of three fails to comply, then a second set of three are tested. All three of this second set must comply. HB rated materials are considered “self-extinguishing”. This is the lowest (least flame retardant) UL94 rating.

Material specifications

Material selection and specifications

Selecting the right material for your applications
ABB offers cable ties and accessories in a wide variety of materials, each suited for specific environments. The purpose of this document, therefore, is to assist in choosing the best material for a particular application.

The effects of weathering, flame, chemicals, extreme temperatures and radiation on the different materials is clearly presented in tabular form. This will facilitate the choice of the best material for the application.

Having determined the most suitable material, one can choose from the wide variety of cable ties, identification ties, mounting bases, lashing ties, etc., offered by ABB.

Material specifications
Note: Nylon (Polyamide) is inherently susceptible to environmental conditions. Polyamide 6.6 cable ties are moisturised to optimum performance levels at machine-side and should be stored in cool dry areas out of direct sunlight. Cable ties are packaged in plastic bags to contain moisture and should remain sealed until ready for use.

Polyamide 6.6

- Thermoplastic material used in cable ties for universal applications in the industry
- Excellent resistance to shocks, chemicals, oils and temperature fluctuations
- High surface hardness and a small coefficient of friction
- Flammability rating: UL 94 V-2
- Halogen free and Silicone free
- Indoor applications

Polyamide 6.6, weather resistant

- Similar to Polyamide 6.6, but recommended for outdoor applications
- UV-resistant
- Halogen free and Silicone free
- Ty-Fast ties in weather resistant Polyamide 6.6 are available in black color only (with 2% carbon for military specifications)
- Ty-Rap ties in weather resistant Polyamide 6.6 are available in black color (with 2% carbon for military specifications) and in a wide range of colors (except natural)
- Flammability rating: UL 94 V-2

UV-resistant Weather-proof

Material specifications

Material selection and specifications

Polyamide 6.6, heat stabilised

- Similar to Polyamide 6.6, but increased operating temperatures, up to 105°C (221°F)
- Excellent tensile strength
- High temperature resistance
- Color: natural (may have a greenish tint)
- Flammability rating: UL 94 V-2

Heat resistant

Polyamide 6.6, heat stabilised and UV-resistant

- Similar to Polyamide 6.6, but recommended for outdoor applications and/or high temperature applications, up to 105°C (221°F)
- Combines the features & benefits of Polyamide 6.6, weather resistant and Polyamide 6.6, heat stabilised
- Color: black
- Flammability rating: UL 94 V-2

UV-resistant Weather-proof Heat resistant

Polyamide 12, weather resistant

- Extremely flexible, also at low temperatures
- Ages better than Polyamide 6.6
- UV-resistant and weatherproof
- Better chemical resistance than Polyamide 6.6
- Color: black
- Flammability rating: UL 94 V-2

UV-resistant Weather-proof Low temperature flexibility Chemically resistant

Polyamide 6.6, flame retardant

- Excellent flammability rating: UL 94 V-0
- Ideal in areas where human life is at risk
- Color: white


Flame retardant

Polyamide 6.6 detectable

- Similar to Polyamide 6.6, but contains a compound detectable by metal detectors (tested and rated at 1.5mm (0.06") diameter ferrous sphere setting) and X-ray equipment
- Color: bright blue, also contributes to visual detection
- Especially recommend for the food industry, and for any other contamination sensitive industry using detection equipment
- Halogen free and silicone free
- Flammability rating: UL 94 V-2


Detectable

Polyamide 4.6, extra high temperature (150°C)

- Similar to Polyamide 6.6, but outstandingresistance to high temperatures up to 150°C (221°F)
- Halogen free and silicone free
- Color: light green
- Flammability rating: UL 94 V-2

Heat resistant

Material specifications

Material selection and specifications

Polypropylene, weather resistant

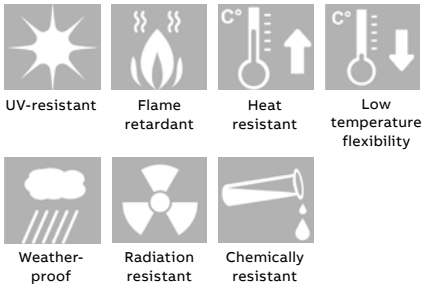
- Resistant against inorganic acids, polyhydric alcohols, neutral and basic salts
- Resists a number of other chemicals
- UV resistant
- Lower tensile strength than Polyamide 6.6
- Color: black
- Flammability rating: UL 94 HB

Polypropylene, detectable

- Similar to standard Polypropylene, but contains a compound detectable by metal detectors (tested and rated at 1.5mm (0.06") diameter ferrous sphere setting) and X-ray equipment
- Color: bright blue, also contributes to visual detection
- Especially recommend for the food industry, and for any other contamination sensitive industry using detection equipment
- Halogen free and silicone free
- Flammability rating: UL 94 HB

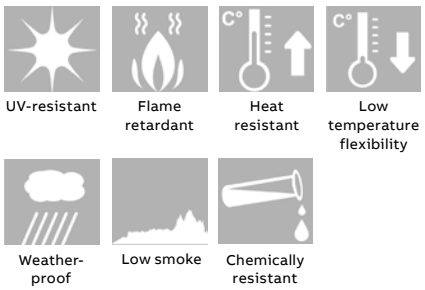
ETFE Fluoropolymer

- Tensile strength slightly lower than Polyamide 6.6
- ETFE Fluoropolymer is inert to most solvents and chemicals, hydrolytically stable, UV and weather resistant
- Radiation resistant (meets IEEE383) and approved for nuclear plant use
- Non-outgassing properties for zero gravity applications
- Very high temperature resistance
- Flammability rating: UL 94 V-0
- The best all around plastic material for cable ties
- Color: aquamarine



ECTFE Fluoropolymer

- Similaire aux performances du ETFE fluoropolymère
- Faible émission de fumée lors de sa combustion
- Recommandé pour les applications liées à la ventilation, aération, évacuation de fumée
- Couleur: Bordeaux
- Flammability rating: UL 94 V-0



Material specifications

Material selection and specifications

Toughened weatherable acetal

- Excellent resistance to a wide variety of solvents, esters, oils, greases, gasoline and other petroleum hydrocarbons
- Resistant to weak acids and bases
- Excellent resistance to UV
- Limited self-extinguishing properties
- Color: black
- Flammability rating: UL 94 HB

UV-resistant | Weather-proof | Chemically resistant

Material selection ordering guide

Chemical resistance

Table 3 shows the resistance of Ty-Rap cable tie materials to various chemicals. The table is designed to help you determine the cable tie material best suited for a particular chemical environment.

Table 3: Resistance of available materials to various chemicals at 21°C

Reagents	Concentration	HS PA6.6	TV	DEL	PA6.6	UV PA6.6	FR PA6.6	UV PA12	PP	UVPP	TZ	SS
Arsenic Acid	40%	–	–	–	–	–	–	–	E	E	–	E
Acetaldehyde	50%	S	–	–	S	S	S	–	–	–	–	–
Acetone	100%	E	E	F	E	E	E	E	E	E	E	E
Aluminum Hydroxide	AQ	–	E	–	–	–	–	–	E	E	E	E
Ammonia	All	–	E	–	–	–	–	E	E	E	E	15.0
Ammonium Carbonate	5%	S	E	–	S	S	S	E	E	E	E	E
Ammonium Hydroxide	10%	E	E	F	E	E	E	–	E	E	E	E
Ammonium Nitrate	–	–	E	–	–	–	–	E	E	E	E	E
Ammonium Sulfate	10%	–	E	–	–	–	–	S	S	S	S	S
Barium Carbonate	All	–	E	–	–	–	–	E	E	E	E	E
Barium Chloride	5%	NR		–	NR	NR	NR	E	E	E	E	E
Barium Sulfate	10%	E		–	E	E	E	E	E	E	E	E
Barium Sulfide	10%	S		–	S	S	S	E	E	E	E	E
Benzene	100%	E	E	F	E	E	E	E	S	S	E	E
Benzoic Acid	100%	NR	E	–	NR	NR	NR	E	E	E	E	E
Butyric Acid	50%	NR	E	–	NR	NR	NR	–	E	E	E	E
Calcium Carbonate	AQ	–	E	–	–	–	–	–	E	E	E	E
Calcium Hydroxide	20%	–	F	E	–	–	–	–	E	E	E	E
Calcium Hydrochlorite	2	NR	–	–	NR	NR	NR	–	F	F	F	F
Calcium Sulfate	2%	–	E	–	–	–	–	–	E	E	E	E
Carbon Tetrachloride	100%	E	E	E	E	E	E	E	F	F	E	E
Chlorine (WET)	–	NR	–	–	NR	NR	NR	–	F	F	F	F
Chlorine (DRY)	–	NR	–	–	NR	NR	NR	–	NR	NR	F	F
Chloroacetic Acid	30%	NR	–	–	NR	NR	NR	–	–	–	F	F
Chloroform	100%	–	E	–	–	–	–	F	F	F	E	E
Chromic Acid	50%	NR	S	–	NR	NR	NR	–	F	F	F	F
Citric Acid	50%	S	E	E	S	S	S	E	E	E	E	E
Copper Cyanide	10%	–	E	–	–	–	–	–	E	E	E	E
Copper Nitrate	50%	–	E	–	–	–	–	–	E	E	E	E
Cider	–	–	E	–	–	–	–	–	E	E	E	E
Dichloroethane	100%	–	E	–	–	–	–	–	–	–	E	E
Diethyl Ether	100%	–	E	S	–	–	–	E	E	E	E	E
Ethyl Alcohol	100%	S	E	–	S	S	S	E	E	E	E	E
Ethyl Chloride	100%	–	S	E	–	–	–	F	F	F	E	E
Ethylene Glycol	100%	E	E	S	E	E	E	–	E	E	E	E
Ferric Hydroxide	All	–	E	–	–	–	–	–	E	E	E	E
Ferric Nitrate	10%	–	E	–	–	–	–	–	E	E	E	E
Ferrous Sulfate	10%	–	E	–	–	–	–	–	E	E	E	E
Fuel Oil	100%	–	E	–	–	–	–	E	–	–	E	E

Ratings
E = Excellent
S = Satisfactory
F = Fair
NR = Not Recommended
(AQ = Aqueous)

Material selection ordering guide

Chemical resistance

Table 3: Resistance of available materials to various chemicals at 21°C

Reagents	Concentration	HS PA6.6	TV	DEL	PA6.6	UV PA6.6	FR PA6.6	UV PA12	PP	UVPP	TZ	SS
Furfural	100%	–	E	–	–	–	–	–	F	F	E	E
Gallic Acid	AQ	–	E	–	–	–	–	–	–	–	E	E
Gasoline	100%	E	E	–	E	E	E	–	S	S	E	E
Glycerine	100%	–	E	–	–	–	–	E	E	E	–	E
Hydrocyanic Acid	All	–	E	–	–	–	–	–	E	E	E	E
Hydrogen Peroxide	30%	NR	E	F	NR	NR	NR	S	E	E	E	E
Hydrogen Sulfide	Dry	NR	E	–	NR	NR	NR	E	E	E	E	E
Iodoform	100%	–	E	–	–	–	–	–	–	–	E	E
Isopropyl Alohol	100%	S	E	–	S	S	S	E	E	E	E	E
Jet Fuel	100%	E	E	–	E	E	E	–	S	S	E	E
Lactic Acid	10%	E	E	–	E	E	E	S	E	E	E	E
Lanolin	10%	E	E	–	E	E	E	E	E	E	E	E
Lead Acetate	5%	–	E	–	–	–	–	–	E	E	E	E
Linseed Oil	10%	E	E	E	E	E	E	E	E	E	E	E
Magnesium Carbonate	All	–	E	–	–	–	–	E	E	E	E	E
Magnesium Chloride	10%	F	–	–	F	F	F	F	F	F	F	F
Magnesium Nitrate	All	–	E	–	–	–	–	E	E	E	E	E
Malic Acid	AQ	–	E	–	–	–	–	–	E	E	E	E
Mercury	100%	–	E	–	–	–	–	E	E	E	E	E
Methyl Alcohol	100%	S	E	–	S	S	S	E	E	E	E	E
Methyl Chloride	100%	–	S	–	–	–	–	–	S	S	E	E
MethylEthyl Ketone	100%	–	E	F	–	–	–	E	E	E	E	E
Naptha	100%	–	E	–	–	–	–	–	E	E	E	E
Nitric Acid	30%	NR	E	NR	NR	NR	NR	–	E	E	E	E
Nitric Acid	30-70%	NR	S	NR	NR	NR	NR	–	F	F	S	E
Nitrous Acid	5%	–	E	–	–	–	–	–	F	F	E	E
Oieic Acid	100%	–	E	S	–	–	–	–	E	E	E	E
Oxalic Acid	10%	–	E	–	–	–	–	S	E	E	E	E
Paraffin	100%	E	E	–	E	E	E	E	E	E	E	E
PetroleumEther	100%	–	E	–	–	–	–	E	F	F	E	E
Phenol	90%	NR	E	NR	NR	NR	NR	–	E	E	E	E
Phosphoric Acid	10%	NR	E	–	NR	NR	NR	–	E	E	E	E
Picric Acid	1%	–	E	–	–	–	–	–	E	E	E	E
Potassium Bromide	AQ	–	–	–	–	–	–	–	S	S	S	S
Potassium Carbonate	1%	–	E	–	–	–	–	E	E	E	E	E
Potassium Chlorate	AQ	–	E	–	–	–	–	S	E	E	E	E
Potassium Dichromate	40%	NR	E	–	NR	NR	NR	F	E	E	E	E
Potassium Ferrocyanide	25%	–	E	–	–	–	–	–	E	E	E	E
Potassium Hydroxide	5%	S	E	–	S	S	S	–	E	E	E	E

Ratings
E = Excellent
S = Satisfactory
F = Fair
NR = Not Recommended
(AQ = Aqueous)

Material selection ordering guide

Chemical resistance

Table 2: Resistance of available materials to various chemicals at 21°C

Reagents	Concentration	HS PA6.6	TV	DEL	PA6.6	UV PA6.6	FR PA6.6	UV PA12	PP	UVPP	TZ	SS
Potassium Iodide	All	–	E	–	–	–	–	E	E	E	E	E
Potassium Nitrate	50%	F	E	–	F	F	F	E	E	E	E	E
Potassium Permanganate	5%	NR	E	S	NR	NR	NR	NR	E	E	E	E
PotassiumSulfate	5%	–	E	–	–	–	–	E	E	E	E	E
PotassiumSulfide	AQ	–	E	–	–	–	–	–	E	E	E	E
Propyl Alcohol	100%	E	E	–	E	E	E	–	E	E	E	E
Silver Nitrate	10%	–	E	–	–	–	–	E	E	E	E	E
Sodium Acetate	60%	E	E	–	E	E	E	–	E	E	E	E
Sodium Bicarbonate	All	E	E	–	E	E	E	E	E	E	E	E
Sodium Bisulfate	10%	–	E	E	–	–	–	E	E	E	E	E
Sodium Borate	All	–	E	–	–	–	–	–	E	E	E	E
Sodium Carbonate	5%	E	E	S	E	E	E	E	E	E	E	E
Sodium Chlorate	25%	–	E	E	–	–	–	S	E	E	E	E
Sodium Chloride	2%	E	E	S	E	E	E	E	E	E	E	E
Sodium Fluoride	5%	–	–	–	–	–	–	–	F	F	F	F
Sodium Hydroxide	10%	E	E	S	E	E	E	E	E	E	E	E
Sodium Hyposulfite	AQ	–	E	–	–	–	–	–	–	–	E	E
Sodium Nitrate	5%	E	E	–	E	E	E	E	E	E	E	E
Sodium Nitrite	AQ	–	E	–	–	–	–	S	E	E	E	E
Sodium Perchlorate	10%	–	E	–	–	–	–	–	–	–	E	E
Sodium Phosphate	5%	–	E	–	–	–	–	E	E	E	E	E
Sodium Sulfate	5%	S	E	–	S	E	E	E	E	E	E	E
Sodium Thiosulfate	5%	–	–	S	–	–	–	S	S	S	S	S
Stearic Acid	100%	–	E	–	–	–	–	F	E	E	E	E
Sulfur	100%	–	E	–	–	–	–	E	E	E	E	E
Sulfur Dioxide	All	NR	E	–	NR	NR	NR	E	E	E	E	E
Sulfuric Acid	Conc.	NR	E	NR	NR	NR	NR	–	S	S	E	E
Sulfuric Acid	5%	NR	F	F	NR	NR	NR	F	F	F	F	F
Tannic Acid	10%	–	E	–	–	–	–	–	E	E	E	E
Tartaric Acid	50%	–	E	E	–	–	–	E	E	E	E	E
Tetrahydrofuran	100%	–	F	E	–	–	–	S	F	F	E	E
Toluene	100%	E	E	F	E	E	E	E	F	F	E	F
Xylene	100%	E	–	E	E	E	E	F	F	E	E	E
Zinc Chloride	70%	F	E	NR	F	F	F	E	E	E	E	E
Zinc Nitrate	AQ	–	E	–	–	–	–	E	E	E	E	E
Zinc Sulfate	AQ	–	E	–	–	–	–	E	E	E	E	E

Ratings
E = Excellent
S = Satisfactory
F = Fair
NR = Not Recommended
(AQ = Aqueous)

Material specifications

Adhesive material specifications

Installation instructions for self-adhesive mounting bases

- Mounting surfaces should be cleaned with alcohol based (IPA) cleaner before application
- The self-adhesive mounting bases have a double-sided adhesive tape made of synthetic foam, covered by a protecting foil
- To install the self-adhesive mounting base, remove the protecting foil and press the mounting base onto the cleaned surface
- The thickness of the self-adhesive foam (0.8mm) compensates the irregularities of the application surfaces and allows installations on structured surfaces of cabinet doors, on sheet metal, on machines, etc
- The adhesion is achieved immediately during the installation, which means that later repositioning is not possible

Cat. no.: TC2PA

Characteristics

- 2 component glue
- Consists of one tube each of adhesive and activator
- Easy application
- Stable and durable adhesion
- Applicable on all Polyamide and Aluminium mounting bases and cable clamps
- Also applicable on concrete and other porous surfaces
- UV resistant

Technical information

- Description: 2 component glue
- Weight: 0.21 kg

Installation instructions for Cat. no.: TC2PA (2 component glue)

- Mounting surfaces should be cleaned before application
- The liquid adhesive in the tube is to be spread onto the mounting surface. It can be used on most rough surfaces (like concrete)
- The activator liquid is then spread onto the surface of the mounting base
- Place the surface of the mounting base in contact with the surface where it has to be mounted, position the mounting base correctly and then press firmly
- Repositioning the mounting base remains possible only for a few seconds
- Do not use the mounting base immediately after installation. The Acrylic-based adhesive requires a set-up time that can be influenced by factors such as temperature (allow 24 - 72 hours for maximum performance)
- Temperature of installation needs to be above +20°C (68°F)

Adhesive material specifications

Property	Method	Unit of measure	Rubber based (self-adhesive)	Acrylic based (2 compound glue)
Coated sides	–	each	2	2
Foam density	–	Kg/m^3	96.9	96.9
Peel adhesion	PSTC 1	N/cm width	10.9	10
	ASTM D 1000	Average		8.8
Shear adhesion	natural	15.0	15.0	10
22°C (71.6°F) 50% RH	PSTC 7	Hours	100 +	8 +
22°C (71.6°F) occasional wetting		N/m^2	68971	15174
Tensile strength	ASTM D 412	PSI	100	100 +
Tear resistance	ASTM D 624	N/cm	52.6	52.6 +
Elongation at break	–	%	400	200
Service temperature	–	°C/°F Min	-18	-29
	–	°C/°F Max	+66	+79
Flammability	ASTM D 624		Slow burn	Slow burn

Material specifications

Unit conversion factors

Unit conversion factors

Unit	x	Constant	=	Unit
BTU		778.0		foot-pound (ft x lb)
BTU		1054.8		Joules
BTU		0.293		Watt-hours (W x h)
centimetres (cm)		0.032808		feet (ft)
centimetres (cm)		0.3937		inches (in)
centimetres (cm)		0.00001		kilometres (km)
centimetres (cm)		0.010		metres (m)
centimetres (cm)		10.0		millimetres (mm)
circular mils		0.00064516		circular millimetres
circular mils		0.0000007854		inches^2 (in^2)
circular mils		0.000506671		square millimetres (mm^2)
circular mils		0.7854		mils^2
cubic centimetre (cm^3)		0.000035314		cubic foot (ft^3)
cubic centimetre (cm^3)		0.061023		cubic inch (in^3)
cubic centimetre (cm^3)		0.000001		cubic metre (m^3)
cubic centimetre (cm^3)		0.0026417		gallons
cubic foot (ft^3)		17,280		cubic inch (in^3)
cubic foot (ft^3)		28317.016		cubic centimetre (cm^3)
cubic inch (in^3)		0.00057870		cubic feet (ft^3)
cubic inch (in^3)		0.000016387		cubic metre (m^3)
cubic inch (in^3)		16.387162		cubic centimetre (cm^3)
cubic metre (m^3)		1,000,000.0		centimetre (cm)
cubic metre (m^3)		35.314456		cubic foot (ft^3)
cubic metre (m^3)		264.17		gallons
foot (ft)		0.00018939		miles
foot (ft)		0.33333		yards (yd)
foot (ft)		12		inches (in)
foot (ft)		0.00030480		kilometres (km)
foot (ft)		0.30480		metres (m)
foot (ft)		30.480		centimetres (cm)
foot (ft)		304.80		millimetres (mm)
foot/pound (ft/lb)		0.00067197		metres/grams (m/g)
foot-pound (ft x lb)		0.001285		BTU
foot-pound (ft x lb)		1.356		Joules (J)
foot/pound (ft/lb)		0.1383		kilogram/metre (kg/m)
gallons (US)		3.785332		litres (l)

Unit	x	Constant	=	Unit
gallons		0.13368		cubic foot (ft^3)
gallons		231.0		cubic inch (in^3)
gallons		3,785.332		cubic centimetres (cm^3)
grams (g)		15.432		grains
gram/centimetre^3 (gm/cm^3)		0.0361275		pounds/in^3 (lb/in^3)
horsepower (hp)		33,000.0		ft x lb/min
horsepower (hp)		550.0		ft x lb/sec
horsepower (hp)		745.7		Watts (W)
inch (in)		0.027178		yards (yd)
inch (in)		0.083333		feet (ft)
inch (in)		0.00002540		kilometre (km)
inch (in)		0.025400		metre (m)
inch (in)		2.54000514		centimetre (cm)
inch (in)		25.4000514		millimetre (mm)
inch (in)		1,000.0		mils
Joules		0.000948		BTU
Joules		107		ergs
liters (l)		61.0250		cubic inch (in^3)
metres (m)		1.093611		yard (yd)
metres (m)		3.2808333		feet (ft)
metres (m)		39.37		inch (in)
metres (m)		100.0		centimetre (cm)
miles		1,760.0		yards (yd)
miles		5,280.0		feet (ft)
miles		1.6093		kilometre (km)
millimetres (mm)		0.0032808		feet (ft)
millimetres (mm)		0.03937		inch (in)
millimetres (mm)		0.001		metres (m)
millimetres (mm)		0.01		centimetres (cm)
millimetres (mm)		39.3701		mils
millimetres (mm)		1,000.0		microns (µm)
Watts (W)		44.25		ft x lb/minute
Watts (W)		0.737562		ft x lb/sec
Watts (W)		0.001341		horsepower (hp)
Watt-hours (W x h)		3.41266		BTU