

Material resistance

Device platform EAGLE ET-xx6-A / MT-xx6-A



Valid for HW Revision 3 - all version

Document version: Issue date: 03.00.03 31.01.2023

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1 General

This manual contains information on the resistance of the HMI devices to various environmental factors. These have an impact on the mechanical, thermal, chemical and corrosive stability of the HMI devices.

The resistance to chemicals was tested according to DIN 42115 Part 2, i.e. the stability over 24 hours without visible changes to the HMI devices.

For the corrosion test the HMI units were tested in an artificial atmosphere and a very low concentration of corrosive gas, according to EN 60068-2-60.

2 Design



3 Materials

Application	Material
Membrane top	Polyester or stainless steel
Touch screen	Polyester
Display window	Safety glas
Front plate	Aluminum
Housing	Stainless steel
Front panel seal	Polyurethane
Back cover seal	Silicone
(not visible)	

3.1 Material properties

 NOTICE
 The selection of chemicals listed here is not exhaustive.

 Further information can also be found on the following homepage:

 http://macdermidautotype.com/

3.1.1 Entire device

The chemical substances and resistances are the lowest common denominator of all materials used in the HMI device. Thus, the entire device has a somewhat lower chemical resistance
than the individual materials.

Property	Chemical material class / group	Chemical substances	Test method
Chemical			
Chemical resistance	Alcohols	Glycerin	
	Aldehydes	Formaldehyde 37 - 42 %	DIN 42115 DIN 52461
	Household chemicals	Detergents	DIN 55401
	Oils	Petrol	
Property	Res	stance Test method	
Mechanical			Autotico
Service life after imprint	5 million touches		Autotype
Operating force	max. 50 N		
 MIT folding resistance 	>20000 folding operations		ASTIVI DZ170
Thermal			Autotico
Dimensional	Max. 0.2 % at 120° lor	ngitudinal	Autotype
Dimension stability	Typically 0.1 %		method

3.1.2 Front foil (Polyester)

	Property	Chemical material class / group	Chemical substances	Test method
Ch	emical	Alcohols	1,3 Butanediol	
•	Chemical		1,4 Butanediol	
	resistance		Cyclohexanol	
			Diacetone alcohol	
			Ethanol	
			Glycol	DIN 42115
			Glycerol	DIN 53 461
			Isopropyl alcohol	Oder
			Methanol	ASTM-F-1598-95
			Neopentyl glycol	
			Octanol	
			1,2 Propylene glycol	
			Triacetin	
			Dowandol DRM/PM	
		Aldehydes	Acetaldehyde	
			Formaldehyde 37 - 42 %	
		Amines	Ammonia < 2 %	
		Esters	Amyl acetate	
			Ethylacetate	
			N-Butyl acetate	
		Ethers	1.1.1. Trichloroethane	
			Ether	
			Dioxane	
			Diethyl ether	
			2-Methyltetrahydrofuran	
			(2-ME-THF)	

Aromotio	Donzono		
AIOMALIC			
nydrocarbons	loluene		
	Aylene		
	Paint thinner (white spirit)		
Ketones	Acetone		
	Methyl ethyl ketone		
	Cyclohexanone		
	Methyl isobutyl keton (MIBK)	е	
	Isophorone		
Diluted acids	Formic acid	<50 %	
	Acetic acid	< 5%	
	Phosphoric acid	<30 %	
	Hydrochloric acid	<10 %	
	Nitric acid	<10 %	
	Trichloroacetic acid	~50 %	
	Sulfurio acid	~20 %	
Diluted eliteleide			
(bases)	Caustic soda	<40 %	
Household chemicals	Ajax		
	Ariel		
	Domestos		
	Downey		
	Fantastic		
	Formula 409		
	Gumption		
	let Dry		
	Lopor		
	Doroil		
	Topoido		
	Top Jop		
	Vim		
	Vortex		
	Washing powder		
	Fabric conditioner		
	Whis		
	Windex		
Oils	Petrol		
	Drilling muds		
	Braking fluid		
	Decon foam		
	Diesel oil		
	Varnish		
	Keroflux		
	Paraffin oil		
	Solvent naphta		
	Mineral turpentine		
	Kerosene		

	No specific material class	AcetonitrileAlkali carbonateDichromatesPotassium dichromateCaustic sodaCaustic sodaDibutyl phthalateIron II chloride (FeCl2)Iron II chloride (FeCl3)HaloalkanesPotassium soapPotassium soapPotassium hydroxideSodium bisulfateTetrachloroethyleneSalt water	
		Water Hydrogen peroxide >25 %	
Property		Resistance	Test method
 Mechanic (keyboard) Service life after impr Operating force MIT folding resistance 	int 5 million touc max. 50 N e >20000 foldin	ches ng operations	Autotype method ASTM D2176
Mechanic (touch screen) • point activation 1 million activa		vations at any single point	3M method
Thermal• Dimensional• Dimension stabilitytypically 0.1 %		at 120° longitudinal %	Autotype method

3.1.3 Touch screen

Property	Chemical material class / group	Chemical substances	Test method
ChemicalChemical resistance	(see front membrane)	(see front membrane)	(see front membrane)
Property	Resista	ance	Test method
MechanicalService life after imprintMIT folding resistance	(see front me	embrane)	(see front membrane)
Thermal Dimensional Dimension stability 	(see front me	embrane)	(see front membrane)

3.1.4 Front panel seal

Property	Chemical material class / group	Chemical substances	Test method
Chemical			
Chemical resistance	Alcohols	Glycerol	
	Aldehydes	Formaldehyde	
	Ketones	Acetone	
	Household chemicals	Detergents	
		Soap suds	DIN 53461
	Oils	Petrol	
		Diesel oil	
		Heizöl	
		Hydrauliköl	
		Leinöl	
Property	Resist	ance	Test method
Mechanical	(No information ava	ailable at present)	
Thermal			DIN 53461
 Installation area 	-30 °C to 80 °C		

3.1.5 Back cover seal

Property	Chemical material class / group	Chemical substances	Test method
Chemical			
Chemical resistance	Alcohols	Methanol	
		Glycerol	
	Aldehydes	Formaldehyde	
	Amines	Ammonia	
	Diluted acids	Sulfuric acid 25 %	
	Household chemicals	Detergents	DIN 53461
		Soap suds	
	Oils	Petrol	
		Braking fluid	
		Mineral oils	
		Engine oils	
		Lube oil	
Property	Resist	ance	Test method
Mechanical	(No information ava	ailable at present)	
Thermal			DIN 52461
 Installation area 	-60 °C to 200 °C		DIN 33401

4 Corrosion test

- with flowing mixed gas

The HMI units are resistant to corrosive chemicals according to the table below:

	Property	0	Chemical substances	Concentration	Test method
•	Corrosive	H_2S	Hydrogen sulfide	10 ppb (±5)	
	resistance	NO ₂	Nitrogen dioxide	200 ppb (±20)	
		CL ₂	Chlorine (gas)	10 ppb (±5)	
		SO ₂	Sulfur dioxide	200 ppb (±20)	EN 60068-2-60
	Condition			method 4	
•	Temperature		25 °C (±1)		
•	Relative humidity		75 % (±3)		
•	Duration		21 days		

5 Release notes

The chapter entitled "Release Notes" contains all the changes made in every version of this document.

Version 03.00.00

- First edition of the manual
- Addition of the information from the operating instructions
- Addition of corrosion test with flowing mixed gas
- Text and layout corrections

Version 03.00.01

- Changing address and phone numbers
- Formal changes

Version 03.00.02

- Changing title into material resistance
- Changing document name from "FR" into "MR"
- Including disclaimer
- Formal changes

Version 03.00.03

- Changing layout cover
- Changing disclaimer
- Adaption address field verso
- Formal changes

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