

FLEX&ROBUST

Product: Flexible structural connectors

Flex And Robust (FAR) produces and commercializes Polyurethane Flexible Joints. FAR offers flexible structural connections in civil engineering, carrying loads and high deformations simultaneously and dissipating energy. Solutions offered by FAR are suitable for seismic and hurricane areas.



Polyurethane Flexible Joints specimens

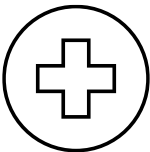
Pilot Measurement & Verification Line 2

Managed by: EURAC Research



PM&VL2

The scope of the PM&VL2 is a complete characterization of all the envelope parts and their effects on internal occupants in real operating conditions. The VOC (Volatile Organic Compounds) Lab node offers a characterization of the VOC emissions of building materials under standard or customized environmental conditions.



HEALTH

Which is the need covered by this service?

The analysis aimed at evaluating the potential VOC emissions emitted by polyurethane flexible joints under common indoor environmental conditions (air temperature, relative humidity, air exchange and air velocity).

The emissions tests of the polyurethane joints provided by Flex&Robust are assessed using the emission chambers of the Volatile Organic Compounds lab (VOC lab). The emissions from the investigated materials were evaluated in different contexts representing real conditions including: fresh materials and cured materials.

Design of Experiments

Volatile Organic Compounds (VOC) emissions from materials are measured in accordance with the standard EN 16516:2017 (Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air)

Parameter	Value
Air temperature	23 °C
Relative Humidity	50%
Air Exchange	0.5 ACH
Air velocity	0.1-0.3 m/s

Standard test conditions

Results

The results reported in the table below show the low level of VOC emissions emitted by the polyurethane PM flexible joints in terms of specific emission rate or emission factor per area of the sample (SERA), mass concentration of single VOC in the air of the European Reference Room (Cr), and R values according to the German LCI/NIK list (RD) and Belgian LCI list (RB) after 28 days.

Parameter	CAS No.	SER _A 28days [µg/m² h]	C _r 28days [µg/m³]	EU-LCI [µg/m³]	R _D	R _B
2-Ethyl-1-hexanol	104-76-7	5.53	< 1	800	-	-
2-Ethoxyethyl acetate	111-15-9	48.83	< 1	50	-	-
1-Butanol	71-36-3	41.74	< 1	11000	-	-
1,2,4-Trimethylbenzene	95-63-6	21.05	< 1	450	-	-

SER_A: specific emission rate; C_r: concentration in the air of the European Reference Room; EU-LCI: European Lowest Concentration of Interest.

From the following table we can observe how all the tested cured joints emit concentrations of total volatile organic compounds (TVOC) well below the A+ class identified by the French labelling scheme.

	Parameter	Cr 28days [µg/m³]	French Regulation Class A+
PM	TVOC	10	< 1000
PT	TVOC	13	< 1000
PS	TVOC	136	< 1000
PTS	TVOC	22	< 1000

C_r: concentration in the air of the European Reference Room.

Conclusions

The concentration of chemical compounds measured in the air of the European Reference Room (C_r) for the tested products were found to be consistently below the established limits set by the main European regulations and EU-LCI values. This indicates that the emissions from the tested material have a low risk of adverse health effect from long-term exposure to the general population.



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