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### **Position paper regarding proposed legislation aiming at reduction of synthetic polymer microparticles (secondary microplastics). A Croatian perspective**

Road markings are a road feature responsible for organising traffic that bring such enormous safety advantage that they cannot be effectively replaced. In the proposed European Union legislation aiming at the reduction of microplastic emissions, road markings would fall into derogations tentatively listed as 5a, 5b, and 5c. Surprisingly, road markings were treated similarly to other coatings; their unique features associated with the protection of the polymer-bearing layer with glass beads layer and with renewal protocols controlled by these glass beads were apparently disregarded and the perspective of industry was not considered.

It is estimated that in Croatia the annual usage of road marking materials is 4 000 t; that comprises solventborne paints (3 700 t, 80% market share), cold plastic masses (150 t, 10% market share), and thermoplastic masses (150 t, 10% market share). All of these materials upon application are covered with a layer of drop-on glass beads (annual consumption 3 000 t); these glass beads deliver retroreflectivity – the key performance parameter of road markings, and simultaneously protect the underlying materials from abrasion.

When assessing abrasion of road markings to estimate their contribution to secondary microplastic pollution, it is necessary to understand the following:

- All road marking materials are protected by a layer of drop-on glass beads.
- Tyres of passing vehicles do not touch the polymer-bearing materials layer, but are rolling on the surface of the drop-on glass beads.
- These glass beads deliver retroreflectivity, which is the key performance parameter of road markings.
- Upon the drop of retroreflectivity, road markings are renewed with another layer of paint and drop-on glass beads; consequently, stacking of multiple layers occurs.
- The renewal occurs, in vast majority of cases, when there is still a layer of glass beads protecting the underlying paint layer from abrasion. Therefore, emissions of microplastics until that point can be considered as negligible.

Whereas the regulatory requirement in Croatia for renewal of road markings is the drop of retroreflectivity to 100 mcd/m<sup>2</sup>/lx, professional industrial experience indicates that





drop-on glass beads are present and protecting the paint layer until retroreflectivity drops to circa 50 mcd/m<sup>2</sup>/lx; therefore, there is a large safety margin.

- Only in locations exposed to the most severe abrasion conditions (tyres from turning vehicles, snow ploughs activity, etc.) the layer of drop-on glass beads can be lost and the underlying paint can be abraded.
- Based on industrial experiences, confirmed through measurements of retroreflectivity done on the request from Croatian road administrators, loss of retroreflectivity (hence, abrasion) is marginal: out of 20 000 km of the surveyed roads, only 500 km (2,5 %) had retroreflectivity below 50 mcd/m<sup>2</sup>/lx. Indeed, a study done by University of Zagreb on pedestrian crossings, which are the most heavily used elements of road markings, indicated that only about 1% of the surface underwent complete abrasion.

Hence, it can be estimated that out of 4 000 t of the applied road marking materials, only about 2,5% (i.e. 100 t) would be abraded annually; after recalculating for the polymer, microplastic particle contribution in Croatia can be estimated at 15 t (4,28 g/person/year). That quantity is negligible, particularly when compared with the estimates related to tyre rubber abrasion that was reported to reach even 230–4700 g/person/year. Reporting of such negligible amounts to fulfil the demands of the proposed legislation is seen as bringing enormous completely counterproductive bureaucratic burden that would be diverting attention from many meaningful pollution sources.

From the industrial perspective, confirmed by academic assessments, further reduction of microplastics emissions potential from road markings can be achieved through increased quality of their maintenance – earlier intervention (for example, requirement of keeping retroreflectivity above 150 mcd/m<sup>2</sup>/lx) and the use of materials with increased durability are suggested. Such approach would simultaneously lead to better visibility, which can be translated to increased road safety. Because road markings are utilised by the advanced driver assistance systems, the reliability of such systems would increase, too.

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