

**Amendment to OPSS 332, April 2021 always with OPSS 332 (TCP # 000-0082)**

Comment ID-number	Comment	Response
1-1	<p>WORKER EXPOSURE TO HAZARDOUS FUMES AND HOT GASSES. Regarding 332.06.01: This is a serious concern. We suggest that emissions collection systems must be equipped with suction fans capable of maintaining a negative pressure around the heater bed shrouds to prevent the escapement of hazardous fumes and gasses. How to test? We suggest specifying a maximum of 50C measure at a one-meter distance surrounding heater beds shrouds. Visually, if blue smoke is escaping and coming in contact with the workers, there is a severe problem.</p>	<p>Specifying the use of suction fans is not required. The emission limits in Table A of SSP 332F04 are the end results required and if suction fans will help achieve these limits they can be used.</p>
1-2	<p>BLEND UNIT MIXING TIME. Regarding 332.06.03.01: We suggest adding a ‘minimum mixing time’ of at least 20 seconds within the twin-shaft pugmill to ensure particle coating and homogenous mixing.</p>	<p>There are end result requirements for the final hot in-place recycled mix to meet and requirements that the mix is homogenous. Depending on the pugmill and materials, 20 seconds may not be enough to ensure a homogenous mix.</p>
1-3	<p>HOT MILLING PROCESS RESTRICTION. Regarding items 332.02 Definitions, 332.06.01, 332.06.03.02, 332.07.04.02 – We suggest that language specifying the mandatory use of Multi-Stage Hot Milling be modified to allow for the use of any Hot Milling process that meets the remaining proposed criteria of which we have summarized below: Proposed Hot Milling Process Criteria: - Applies adequate heat to sufficiently soften the pavement, followed by the use of milling heads to uniformly remove the heated material to the depth specified in the mix design submission with minimal fracturing of the existing aggregates.</p>	<p>Multi-stage hot milling is required by several other jurisdictions; however, since new trains are being developed and built specifically for Ontario that may provide a way to hot mill without overheating the surface or exposing multiple surfaces to excessive heat, the multi-stage hot milling requirement will be removed from SSP 332F04 until the new systems have been evaluated.</p>

	<ul style="list-style-type: none"> <li>- Achieves the desired HIR mix temperatures</li> <li>- Does not burn or scorch the HMA surface</li> <li>- Does not allow the escapement of hot gasses or hazardous fumes that may harm workers.</li> </ul> <p>We submit there are alternative Hot Milling methods that meet the above criteria.</p> <p>How it works:</p> <p>PHASE ONE – PREHEATING (before milling): Phase One involves an extended and controlled surface preheating (using Hot Air) that softens to a 50mm depth, enabling single-step removal, with a minimum of fracturing of the existing aggregates. Burning, scorching and blue smoke are avoided.</p> <p>POST-HEATING (after milling): Phase Two involves the simultaneous heating and agitation of the removed material. This increase mix temperature improves temperature consistency and removes moisture. The benefits include enhanced rejuvenator mixing, aggregate coating, screed control (ride) and compaction.</p> <p>HOT AIR HEATING: Hot Air produced in a central combustion system is applied to the road surface enabling effective pavement heating without burning, scorching or creating Blue Smoke emissions. The air is immediately vacuumed back into the combustion chamber for reheating and reuse, and a portion is incinerated and exhausted.</p>	
<p>1-4</p>	<p>JOINT HEATING – Regarding 332.07.04.01. We suggest adding language that includes the heating of the “paving joint” to the following sentence to ensure a good thermal bond: “The underlying pavement immediately in front of the placement unit, shall be heated to a temperature of 60 to 80C”.</p>	<p>There is already a temperature requirement for joint heating in OPSS 332 section 332.07.04.02 paragraph 6 that states “Heating units shall overlap the previously HIR adjacent surface by a minimum of 100 mm such that it is heated to a temperature of 80 to 100°C immediately prior to placement of the HIR mix.”</p>
<p>1-5</p>	<p>HOT MILLED MATERIAL TEMPERTATURE – Regarding 332.07.04.01. With reference to the sentence “The hot milled material shall not be heated over 150C”. We assume that the term “hot milled material” means material</p>	<p>Correct, the intent of the specification statement “The hot milled material shall not be heated over 150°C” is not that the surface of the existing pavement cannot be heated above 150°C, but that the hot “milled” material (i.e., material that has</p>

	that has been previously heated and removed, and this does not apply to the preheated pavement surface prior to removal. Please clarify.	been heated and removed already) shall not be heated over 150°C.
1-6	<p>MATERIAL TRANSFER VEHICLE – Regarding 332.06.06:</p> <p>a) Technical Risk: To our knowledge, the use of an MTO with an HIR system has never been tested and there may be unforeseen problems. We suggest field testing before including it in the specification.</p> <p>b) Compatibility with Existing HIR Systems: Before specifying its use, we suggest a study to determine the extent of equipment modifications necessary to use an MTV with existing systems.</p> <p>c) Pre-Determine Necessity for Individual HIR Systems: Some HIR systems may not require the use of an MTO. Can this be studied and determined in advance?</p>	Material transfer vehicles have been shown to reduce segregation. The requirement to use a material transfer vehicle will only be piloted on selected trial contracts for evaluation for further implementation. It is a designer option that may or may not be used. Designer options are not part of the standard specification and not included on all contracts.
2-1	Our equipment widths are set at a maximum of 3.75 metres. Despite what some may claim, it is not possible to change widths on the fly, without creating segregation.	The intent of the specification statement “...and shall have the capability to be modified to accommodate a width of at least 4.5 m” is not that this will be done on the fly, but that certain contracts may require 4.5 m of hot in-place recycling for the entire project and so the modification would be done at the beginning and remain for the entire project.
2-2	A set maximum temperature constraint of 150C when the hot material is being heated is not practical. In order to achieve thermal penetration down 50mm, to avoid aggregate pulverization, the top 1mm to 3 mm for a short duration need to be a higher temperature. Below the top few mms the temperature drops exponentially.	See response to comment 1-5.
2-3	The on board pug mill must be capable of mixing the rejuvenating agent, recycled and new asphalt material “homogeneously”.	Agreed, that is why there is a statement in section 332.06.03.01 that states “The blending unit shall be capable of adding and thoroughly mixing the hot milled material, rejuvenating agent, and beneficiating HMA homogeneously in an onboard pugmill”.
2-4	What is important is “Heat over Time”. Asphalt is inherently a poor conductor so a minimum length of heaters must be a requirement. Without a specified	Specifying a minimum length of heaters is not required. There are end result requirements for the temperature of the mix so it is not over heated and on the underlying milled

	amount of “Heat over Time” you are opening the door potentially to a “Shock and Awe” Contractor. We firmly believe, after 35 years of operating and innovating equipment, that the “Slow and Steady” approach is only way to achieve successful projects.	surface to ensure heat penetration. A requirement for a certain length of heaters may end up over heating or still not producing enough heat depending on the operation/condition of the heaters.
2-5	HIR projects should be tendered as continuous stretches of road and need to be a certain size. It is through “Economies of Scale” that HIR monetary and environmental savings are realized. HIR is not an ideal candidate for segmented small projects.	Agreed, that is why designers are given a guideline of at least 20 lane-km to be considered a candidate for hot in-place recycling.
2-6	HIR is a pavement preservation tool that allows us to maintain the highest value of the non-renewable resources that are in place. In order to utilize HIR effectively jobs should be tendered ideally before the road starts to deteriorate too far. After the road has deteriorated to the point where there is sub base failure then alternative road preservation techniques should be used.	Agreed, that is why designers are given a guideline that hot in-place recycling is limited to resurfacing of flexible pavements exhibiting surficial distresses only.
3-1	We also hold the environment very dear and that’s why we have been recycling 100% for the last thirty years while meeting End Result Specification requirements. We applaud the MTO efforts to decrease the emissions for HIR projects but why are you specifying old technology that creates even more emissions in the form of dangerous vapours that most after burners create. As you know after burners have huge exhaust and heat issues that are concentrated thus creating other dangerous emissions and heat problems. Rather the MTO should look for better controlled heating systems on the equipment performing the HIR work, where smoke and fires are not created by the equipment performing this HIR work.	The emission limits in Table A of SSP 332F04 must be met and currently afterburners and central combustion chambers are the only equipment known to decrease emissions from hot in-place recycling to these limits. If there is other equipment available to reduce the emissions to the limits in Table A please feel free to provide this information.
3-2	Rejuvenators should only be a 100% oil that has the qualities of elastomeric aromatics that revitalize aged asphalt back to its original or better flexibility properties meeting PG Grade before adding BHMA, with the eye of 100% recycling the same product 15 years later.	There are clear requirements for the rejuvenating agent in Table C of SSP 111F13.

	Emulsions should be fully outlawed (water) as MTO is using the words rejuvenating agent in its summary. By the way, the main purpose of heating the aggregate in the asphalt plants rotary DRYER is to REMOVE ALL THE WATER for quality assurance.	
3-3	As we stated in our opening comment we feel that 100% recycling should be MTOs direction and minimally adding of beneficiating Hot Mix Asphalt as a last resort to meet certain specification requirements. Every job has different requirements and you need the flexibility to meet end result specifications that give performance and sustainability of the 100% recycled pavement product now and for the future.	Each individual pavement is different, and some will require the use of beneficiating hot mix asphalt to meet the specifications. The intent of specifying a minimum amount of beneficiating hot mix asphalt is to identify to bidders that beneficiating hot mix asphalt was deemed required by the designer based on the existing conditions.
3-4	We are in full agreement of the MTO's decision to do additional testing of the RAC, however as long as you don't keep lowering the YY cold number from -40 to -34 with a 5 Degree variance allowing a -29 in an area of Ontario that was originally laid at a -40. This is not acceptable testing and hopefully the MTO will see its way clear and re-evaluate your testing specification criteria.	Low temperature grade selection is based on the LTPPBind grade recommended, engineering judgement, and experience in the area. Our RAC specification criteria have been revised to match the RAC criteria for PGAC which considers the testing variability from our RAC correlation.
3-5	Why is the MTO going the trouble of doing compaction core lift thickness when you are allowing up to 40% Beneficiating Hot Mix Asphalt. The added BHMA should be deducted from the core lift thickness and that would be your heated depth of the hot milled material (HIR).	A minimum thickness is required as the end result. A certain depth of milling is not the end result as that is up to the Contractor as long as the grade is not raised more than 15 mm less than the design lift thickness can be hot milled (i.e., hot mill 40 mm and add 10 mm of beneficiating hot mix to get the 50 mm of hot in-place recycled mix required).
3-6	There is no value in adding a material transfer vehicle, it's adding another step to creating a problem to get the finished rejuvenated HMM to the paver and finally laid back down on the road surface. Rather the MTO should be concentrating on the road surface of the implementation of components for operational efficiency. The ideal place for the hot HIR processed material is to be left on the surface to be mixed, blended, rejuvenated, homogenized and other additives as required for the best end result specification. The	See response to comment 1-6.

	handling, picking up, more handling, picking up again and moved to different machinery/equipment is detrimental to a finished rejuvenated quality product to meet ERS.	
3-7	<p>Of concern is the amendment put forth - OPSS 332.06.03.02 Hot Milling Unit.</p> <p>“The hot milling unit shall be capable of uniformly milling the preheated HMA to the hot milling depth according to the mix design submission as specified in the Contract Documents using multi –stage hot milling.”</p> <p>Multi-stage hot milling requires multiple milling and handling of the HMM and is not conducive to producing an HIR or HMA mix as it allows more damage to the aggregate and oxidizes the existing asphalt in the mix making it more difficult for rejuvenation and meeting a End Result Specification.</p>	See response to comment 1-3.
3-8	We are inquiring why the newly proposed amendment within both Design and Submission Requirements 1151.04.01.01 of OPSS 1151 and in the SSP 332F04 332.05.01.03 Rejuvenating Agents, does not restrict the use of emulsions?	See response to comment 3-2.