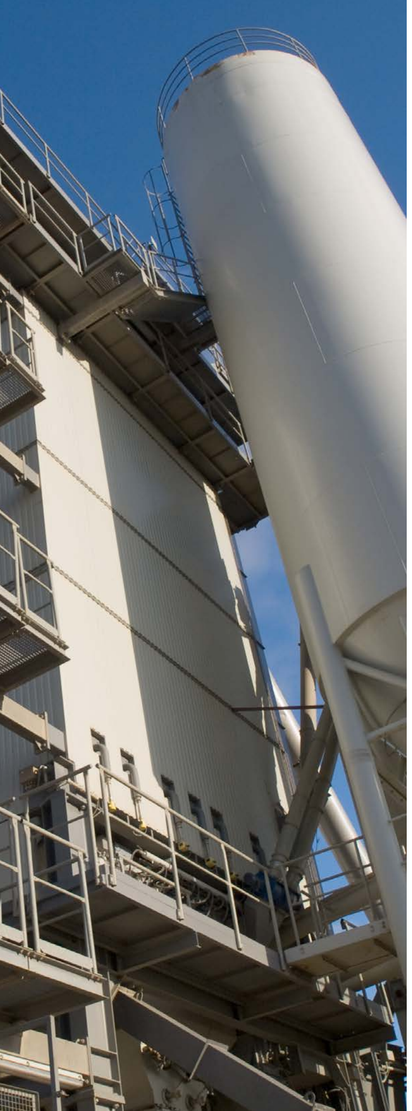

Asphalt Tanker Loading Compatibility Matrix

To Be Loaded \ Previous Load	Asphalt CAS # 8052-42-4	Crude Petroleum and Residual Fuel Oils	Polymer Modified Asphalt	Rubber Modified Asphalt	Cutback Asphalt	Oxidized Asphalt CAS # 64742-93-4	Anionic Emulsion	Cationic Emulsion	Other Products- Unknown or Unidentified
Asphalt CAS # 8052-42-4		◆	○	○	△	○	◆	◆	⊗
Crude Petroleum and Residual Fuel Oils	○		○	○	△	○	△	△	⊗
Polymer Modified Asphalt	○	◆		○	△	○	◆	◆	⊗
Rubber Modified Asphalt	○	◆	○		△	○	◆	◆	⊗
Cutback Asphalt	○	△	○	○		○	△	△	⊗
Oxidized Asphalt CAS # 64742-93-4	○	◆	○	○	◆		◆	◆	⊗
Anionic Emulsion	◆	◆	◆	◆	◆	◆		△	⊗
Cationic Emulsion	◆	◆	◆	◆	◆	◆	△		⊗

Always:

Remove water containing residual products before loading with hot asphalt.

When in doubt contact the producer or supplier of the previous load on how best to handle flushing or other removal practices for the residual material in the tanker.

Take precaution when opening a hatch as H_2S may be present.

○ Empty Residual △ Inspect & Flush ◆ Inspect & Clean ⊗ Special Cleaning Required

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A simple loading matrix chart cannot convey all the nuance and common sense that needs to be considered when deciding how to handle loading one product on top of another in a tanker.

However, there are two rules that need to be followed rigorously:

(1) If the previous load contains water from emulsions or some other product, the tank should be flushed to remove the material containing water. This guide is not intended to cover how to accomplish the flushing. Rather, that procedure is left up to the individual terminal.

(2) DO NOT load any hot asphalt material over 212°F (100°C) into a tanker if the previous load contains either a water containing product or an asphalt cutback until the tanker has been properly cleaned or flushed to remove the residual from the previous load. Water can cause boil overs and vaporizing solvents from cutbacks can cause fires or explosion due to solvent vapor buildup in a sealed tanker. Some of these problems may not occur in the terminal, but rather when the truck is on the highway where greater and more extensive damage can occur. Generally, the flushing material is stored in a tank used for the purpose of flushing tankers. The flushing material can vary depending on the product that needs to be flushed.

There are two symbols on this chart dealing with “Inspection and Clean” or “Inspection and Flush”. “Inspection and Clean” is intended to be a more rigorous removal of previous material from the tanker with the intent that nearly all presence of the previous load has been removed. For example, if the previous load was oxidized asphalt and the new load is to be an asphalt emulsion, then removal of the oxidized material is essential to the extent that discharge lines and on-board pumping equipment are free to operate. The same could be true of cutback asphalt depending on the temperature of the cutback. Other asphalt material listed would be hot enough to not be substantially impacted by residual oxidized binder.

DISCLAIMERS: The purpose of this matrix is to provide information on how to handle loading one product on top of another in a tanker. The information in this document should not be considered exhaustive or complete, but rather as an initial reference source.

The Asphalt Institute does not intend for this document to make any requirements, to set any standards, or to imply any standards. You should always know and comply with all applicable governmental rules, regulations and standards, abide by all applicable company policies and procedures, and use common sense when loading products.

A Detailed Discussion of
Asphalt Institute Loading Matrix

The loading matrix is populated by four symbols as reproduced below. The meaning of each symbol is noted at the bottom of the loading matrix sheet.

The matrix deals with common asphaltic or petroleum materials. There are nine product categories.

1. Plain bitumen or asphalt
2. Crude Petroleum, crude oil (which can contain water), residual fuel oils
3. Polymer modified binders (aka PMA)
4. Rubber Modified asphalt (aka GTR, ground tire rubber)
5. Cutback asphalt
6. Oxidized asphalt
7. Anionic Emulsions
8. Cationic Emulsions
9. Other Products

Loading some of these products on top of a residual amount of another product might not be a problem, but it could be a major problem. This loading matrix will not be able to address every possible situation that can arise. When it comes to interpreting the loading matrix and deciding whether or not to load a product, THIS DOCUMENT CANNOT REPLACE COMMON SENSE AND PRUDENT JUDGEMENT ON THE PART OF ASPHALT TERMINAL OPERATORS. If there is a question of whether or not to load, the right answer is don't load and follow the next step in the hierarchy of solutions. If there is more than an appreciable amount of residual product in the tanker, proceed to the next step in the hierarchy of solutions.

Addressing Category 9 (the Other Products Category) first; the Other Products Category refers to any material that is not listed within categories 1-8. Always check the copy of the bill of lading for the previous hauled load, as drivers do not always recall the contents of the previous load. If the driver does not have the bill of lading, call the carrier's dispatcher and find out. An informed decision cannot be made without knowledge of the previous load. When in doubt either clean the trailer or have the trucking company clean the trailer, but don't load the trailer until you know what was in the trailer.

Looking at the matrix from left to right, and the categories of material from the previous load, the following suggestions are offered:

Category 1 is plain asphalt and if the trailer is functionally empty meaning less than 25 gallons , then loading the open circle symbol materials in the asphalt column should not be a problem. Loading emulsion might not be a problem, but it is better to err on the side of caution. Depending on the asphalt grade previously hauled and the emulsion being loaded, the emulsion could be cool enough such that the residual asphalt might not be fluid enough to pump easily. If certification samples are being pulled, even a small amount of asphalt in the pump, off- line, could result in an off-spec test for sieve. Not every person pulling certification samples waits until one third of the load has been pumped off.

Category 2 is crude petroleum or residual fuel oil. Crude petroleum contamination is likely to be a concern in select locations where crude is being hauled. Crude petroleum can contain water and depending on the crude can contain volatile chemicals. Both of these can cause problems if hot asphalt is loaded on top. Cutbacks are less of a potential problem although some cutbacks are shipped above 100°C. A less rigorous cleaning would be needed before loading cutbacks on top of crude petroleum or residual fuel oil.

Category 3 is polymer modified asphalt (PMA) and if the tanker is functionally empty, less than 25 gallons loading any of the products shown by open circles should not be a problem. A more appreciable amount PMA however could drive a cutback or oxidized material off spec. A crude petroleum or residual fuel oil would soften the PMA and a minimal amount of PMA should not negatively impact those materials. If you are going to load emulsions, the PMA trailer needs to be cleaned to the point that the residual PMA does not cause problems pumping the emulsion and does not cause sieve problems.

Category 4 is rubber modified asphalt and the same comments apply to rubber modified asphalt as apply to PMA binders

Category 5 is cutback asphalt which requires attention based especially on the solvent used to produce the cutback and viscosity grade of the cutback. If the cutback was a rapid cure, which is cut with naphtha, flash point is an issue. Even a small amount of cutback with naphtha can lead to heated atmosphere in the tanker above the flash point. It is prudent to make sure that RC cutbacks are flushed. Medium cure (MC) and Slow Cure (SC) cutbacks are still cut with a light oil product but with a higher flash point. If the tanker last carried MC-30 or MC-70, the tanker should be treated like an RC and clean and flush. Heavier MC's and SC's have the risk of driving the open triangle products off spec for viscosity or stiffness, but if the tanker is emptied to 25 gallons or less there should not be an issue and flash point of the asphalt should not be a problem . It is important to clean the trailer of cutback before loading with oxidized asphalt due to the very high temperatures at which the oxidized product is shipped. Residual levels of cutback would not cause a flash issue with emulsions, but a cutback can easily incorporate into an emulsion during transportation with a potential to alter residue penetration values.

Category 6 is oxidized asphalt and the primary issue with loading oxidized asphalt on top of other products is based on those other products. Oxidized asphalts must be loaded at temperatures above 400°F and therefore any remaining solvents from cutbacks cannot be tolerated and any remaining water from emulsions cannot be tolerated. The hazards of fires or boil-overs can be mitigated by making sure that residual cutbacks and emulsions have been flushed from the trailer into which oxidized asphalt will be loaded. Situations where this might be possible will be rare but MUST NOT be ignored. Therefore, care must be taken to identify the previous material hauled in a trailer to which someone desires to load oxidized asphalt.

Categories 7 and 8 are anionic and cationic emulsions and the response for each with respect to the other asphalt materials is the same. Loading anionic on top of cationic, or cationic on top of anionic, should not be done because of their incompatible emulsifier chemistries. Loading asphalt binders that will be above 100°C on top of residual amounts of emulsion can lead to boil overs. A small amount of water in the trailer with a hot load of asphalt might not boil over at the terminal, but once the truck bounces down the road the water is going to boil, and pressure will build up in the tank. There could be a boil over on the highway or an explosive spray of hot foaming asphalt when the dome cover is opened at the job site. The only safe approach is the make sure the residual emulsion is removed from the tanker. Loading cutbacks requires flushing to remove water, because one always needs to keep in mind some cutbacks ship above 100°C.

This loading matrix cannot cover every possible combination of products to be loaded on top of existing residual materials. This matrix is intended to provide some helpful guidance. For example, if you are loading an emulsion on top of a 30 or 70 grade cutback that COULD result in driving the emulsion residue off specification. Another example would be, if you are loading a 3000-grade cutback on top of an emulsion that COULD result in a boil over depending upon the amount of residual emulsion that is in the trailer. Therefore, for trailers having hauled cutback, if the trailer is not functionally empty it should be flushed prior to loading emulsion and for a trailer having hauled an emulsion it should be flushed prior to loading a cutback. This will be unnecessary in many cases but removes the decision from the hands of the person loading the truck. Ultimately such policies will (hopefully) motivate trucking companies to assign their trailers for the loads that are compatible for the last product hauled.

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Asphalt Tanker Loading Compatibility Matrix