SHELL CARGO HANDLING SHEET

Styrene Monomer

Cargo Handling Sheets are for the use of vessels chartered on behalf of Shell.

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Revision no.21

Product Details

Trade Names:	Styrene Monomer; Circular Styrene Monomer; Renewable Styrene Monomer; B Styrene Monomer; C Styrene Monomer; BC Styrene Monomer; Styrene Monomer Sustainable.
IMO Product Name:	Styrene Monomer
Chemical Family:	Vinyl

Link to Safety Data Sheet

Physical Properties

Density:	906 kg/m3 (20°C / 68°F)
Dynamic Viscosity:	0.7 mPa.s (25°C / 77°F)
Vapor Pressure:	670 Pa (20°C / 68°F)
Boiling Point:	145°C / 293°F
Melting Point:	-31°C / -24°F
Flash Point:	32°C / 90°F
Appearance:	Colourless to yellowish oily liquid, Aromatic hydrocarbon odour

Note 1: Physical Properties are for reference only and valid as of date of this revision; see loading terminal for specific properties.
Note 2: Hazard Identification: Flammable, Static Accumulator; self-reactive and inhibited; heat sensitive and Toxic; See SDS for full list of hazards and precautions.

MARPOL Details

MARPOL Annex:	II
IMO Ship Type:	3
Inland Barge:	Double Hull
IMO Pollution Category:	Y
IBC 16.2.6:	No
IBC16.2.7:	No
IBC 16.2.9:	No
Pre-Wash Required:	No

Compatibility Group:	USCG compatibility group 30

Cargo Handling Requirements

N2 Purge Cargo Tanks Prior Loading:	No; see Regional Requirements
N2 Blanket Required:	Not a Product Quality requirement; see notes below and Regional Requirements
Adjacent Space Purge:	No
Loading Temperature Range:	13 – 23°C / 55 – 73°F; see Regional Requirement
Transit Temperature Range:	Ambient - 30°C / 95°F
Unloading Temperature Range:	Ambient - 30°C / 95°F
Maximum Heating Coil Temperature:	Blanked Off
Maximum Adjacent Temperature:	35°C / 95°F (heated cargoes not allowed)

This cargo has an IBC Code 16.6.1 notation and shall not be exposed to excessive heat to avoid initiating a reaction. For this purpose,

- Be loaded and carried adequately segregated from adjacent spaces with temperature exceeding 35°C / 95°F. Adjacent spaces include but not limited to, adjacent cargo tanks, void spaces, cofferdams, pumprooms, slop tanks, water tanks and these spaces shall not be heated.
- Corner-to-Corner tanks must not be heated exceeding 35°C.
- Owner's stowage should take into consideration that one tank separation to a heated cargo may not be sufficient, stowage should be such that at no time its adjacent space temperature exceeds 35°C.
- This cargo shall not be carried in deck tanks.
- After cargo operations cargo deck lines should be drained empty.

Note 1: The most commonly used polymerisation inhibitor is Para-tertiary Butyl Catechol (p-TBC), typically between 10-15 ppm, or more depending on duration of voyage. If onboard dosing is to be carried out, a written dosing plan should be agreed upon by the cargo surveyor and Master, to ensure that all SM tanks are dosed with the required amount of inhibitor. Onboard dosing should be done using closed method.
Note 2: p-TBC is oxygen-dependent, and vessels shall comply with IBC code 15.13.5, only Nitrogen is acceptable as inerting medium. At no time O2 level shall fall below 4% in the vapor space.
Note 3: a. **DAILY LOG**: During the voyage the vessel shall record following data. Upon completion of unloading or when requested, the vessel shall provide following to responsible Shell Charterer.

- SM tank(s) temperatures (at least twice a day, at least 8 hours apart).
- Adjacent space (empty or full) temperature (at least twice a day, at least 8 hours apart).
- Air and sea water temperatures (at least daily).
- Oxygen content in vapor space of SM tanks (at least daily).

b. Notification: If during the voyage any of the following is observed in any SM tanks, the responsible Shell Charterer shall be notified immediately:

- ≥ 1 °C rise of cargo temperature per day, over 3 consecutive days.

- ≥ 2 °C rise of temperature within any 24 hours.
- Cargo temperature at any level raises above > 30°C.
- O2 content in any tank vapor space ≤4%.
- Adjacent spaces (empty or full) temperature > 35°C.

Note 4: Inhibitor (p-TBC) tends to sink to the bottom over time. For carriage longer than one week vessel shall recirculate styrene twice a week to minimize build-up of polymers, minimize localized heating and facilitate suspension of p-TBC in tanks.
Note 5: Due to risk of polymerization, Styrene should not be carried in tanks serviced by a cargo pump room.
Note6: Further guidance, see: Styrene Monomer Safe Handling Guide

Regional Requirements

Note 1: Shell Moerdijk: loading temperature is ambient and generally ranges between 5 – 30°C / 41 - 86°F
Note 3: US Barge: Coatings – Stainless Steel, Mild Steel, Zinc, Epoxy (refer Tank Acceptance Requirements); N2 not required.

Transshipments

Prior to arranging transshipment Charterer must agree to Owner's proposed plan. When arranged by the Owner, Owner must ensure that all transshipment vessels comply with the requirements of this cargo handling sheet.

Tank Acceptance Requirement	
Banned Prior Cargo:	Yes see table below
Stainless Steel or Coated Tanks:	Stainless Steel or Epoxy coated. Carrier to verify suitability of coating for product.
Note 1: Vessels offered for loading into coated tanks: • Carrier to verify suitability of coating. • For newly coated tanks, either partially or fully recoated, the tanks must have carried 3 or more cargoes for a total of >90days at >90% full. • Tank Coating Condition Questionnaire submitted to Charterers for review prior to fixing a coated vessel. • Coated tanks to be in very good condition with minimal blistering or breakdown, < 0.5% total tank area. • All blisters to be scraped to hard coating. • All defects to be noted in Survey Report • Pipelines and fittings to be stainless steel	
All nominated shipboard cargo handling systems are to be presented clean (residual free), dry, odour free, rust free, with good gaskets, fit to load this cargo.	
Maintenance of heating coils is to be verified in the ship's log. If product is to be heated, heating coils are to be confirmed leak free. If product is not heated, heating coils are to be blown clear and dried with N2, and blanked off.	

Tank Acceptance Requirement - continued
Separation from cargoes which can cause a hazardous reaction or initiate self-polymerization: Products in USCG Compatibility Group 0, 1, 2, 3, 5 could either react in a hazardous manner or initiate a self-polymerization of styrene monomer. When carrying such cargoes there should be an adequate separation from the containment system for styrene monomer with two or more barriers. Ref USCG, Code of Federal Regulations 46, Part § 150 for clarification on two barriers

Banned Prior Cargoes in Coated Tanks

1 of last 2 Prior Cargoes	Stainless Steel	Coated Tanks	Interline 9001 & MarineLINE 784
Benzene, and Mixtures containing > 0.1% benzene	Accepted	Banned Prior	Accepted
Strong Acids and Bases	Accepted	Banned Prior	Accepted
Dyed CPP, due to azo compounds	Accepted	Banned Prior	Banned Prior
Heavy fuel oils, DPP etc.	Accepted	Banned Prior	Banned Prior
Lube Oils	Accepted	Banned Prior	Accepted

Wall Wash Test Requirement	
Wall Wash Required:	Yes, all conducted with Methanol except PH test, which uses DI water.
Coated Tanks:	WWT conducted by cargo surveyor
Stainless Steel Tanks	Verification of shipboard WWT may be accepted if below specs are met. (Send WWT Verification to the responsible Shell charterer and present to cargo surveyor and loading master at loading terminal.) WWT Verification form is available in the supporting documents section on the CHS Website.

Wall Wash Test	Specification	Standard
Hydrocarbons	Pass	ASTM D1722
Chlorides	Max 1.0 ppm	IMPCA 002-98

Additional WWT for Coated Tanks if Prior Cargo is:

Prior Cargo	Test	Required result	Method
Acrylate	PPT	>30 minutes	ASTM D1363
Oils, Waxes, Veg Oils, Fame	NVM	100 ppm	ASTM D1353
Acids, Alkalis	PH Test	6.9 – 7.1	ASTM E70

Safety Information and Incident Reporting

Safety Information: Refer to the SDS (Safety Data Sheet) or e-SDS.
Incident Reporting: All incidents should be reported in accordance with regulations and charter party requirements. For additional marine cargo handling advice or information, contact the regional Chemical Marine Technical Advisor.

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