

Arctic Shuttle Tanker 의 Winterization 적용사례

황창연

Winterization for Arctic Shuttle Tanker

Chang-Yeon Hwang

Abstract : 러시아의 북극해(Northern Sea) 연안은 석유와 천연 가스등 자원이 대규모로 매장된 곳이어서 근래에는 해상을 통한 수송 방법이 적극적으로 추진되고 있다. 최근 쇄빙기능을 가진 컨테이너, 유조선이 발주되었으며 향후 쇄빙 LNG 운반선도 발주될 예정이다. 국내에서는 2005년 말 최초로 러시아 Sovcomflot에서 발주한 쇄빙유조선 70K Arctic Shuttle Tanker를 수주하였으며 Ambient air temperature -40°C (Extreme low temperature -45°C)에 적용한 Winterization에 대해 설명하고자 한다.

Key words : Shuttle Tanker, Winterization, Ventilation, Lifeboat, Davit, Navigation, De-icing


70K Arctic Shuttle Tanker

TANK CAPACITIES		Dimension	
• Cargo oil tank	85,300 m ³	• Length over all	257.0 m
• Ballast water	38,000 m ³	• Length to pp	234.7 m
• Heavy fuel oil	3,500 m ³	• Breadth, max. molded	34.9 m
• Clean oil	2,000 m ³	• Depth, molded	25.3 m
• Fresh water	400 m ³	• Deadweight	14,300 MT
Registration	Russia	• Sealing draught	14.0 m
		• Deadweight at 1.0	70,000 MT

Registration Russia

Dead Classification : RS - ABS
RS, RM, +LCC, SA1 "Ice Tanker" (ESP) with exclusive approval for the shaft power

ABS : +ABS, CE, Carrier, CH, B+C, +AMS, +ACC, VEC, SPM, NBS, ESP, Baltic Ice Class Equivalent to RS Ice Class 1.1E for "Shuttling Tanker"



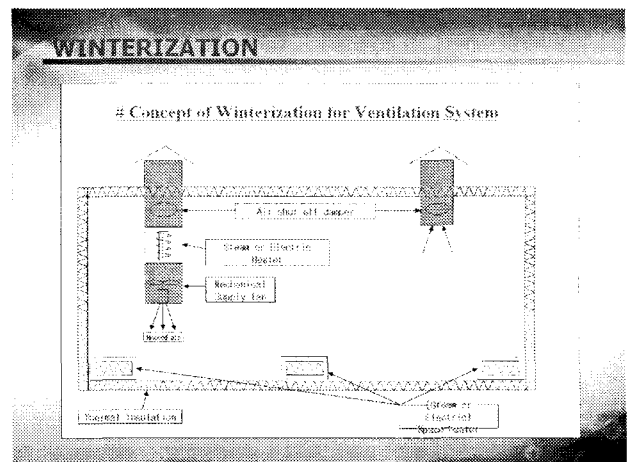
SERVICE SPEED	Approx. 15 knots
ICE SPEED	Approx. 3 knots
One thickness 1.5m + 0.2m (thin)	

PROPULSION SYSTEM

- Type: 2 sets of Auxiliary Pod
- Propulsion power: 2 x 10,000 kW

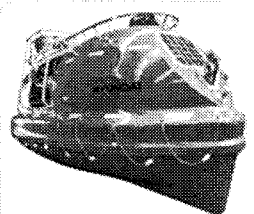

WINTERIZATION & ARCTIC SPECIALTIES

- Air temperature -40°C to -45°C (Extreme -45°C)
- Integration of weather isolation concept
- Pipelines: insulation & heat coating
- Equipment: Heating & Cover
- Anti-icing for Escalator, staircase, Life-saving appliances



WINTERIZATION

Arctic Specialties : Lifeboat

Cover with heating cable (Sample 1)

Heating tracing to be applied as following area:

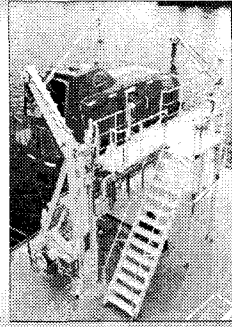
- Side hatch, fwd / aft hatch, top hatch
- Fwd / aft lifting hook

Cover with heating cable to be applied as following area:

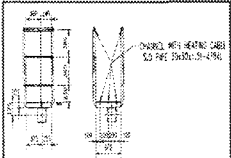
- Battery room
- F.O.Tank
- Fresh water container
- Inventory Storage Space

WINTERIZATION

Arctic Specialties : Lifeboat Davit



- Cover with heating cable at the sheave of derrick, davit stack
- Channel with heating cable at the boarding platform
- Heating cable at the handrail of boarding platform
- Heating cable at the inclined ladder (1 or rail, step) for boarding platform



Channel with heating cable (Sample 2)

* 황창연, 삼성중공업 기본설계1팀, E-mail : cy.hwang@samsung.com, Tel: 055) 630-4868

WINTERIZATION

✓ Arctic Specialties for Other Hull Outfitting Equipment

Equipment	Description	Remark
Row Loading Door	Piping system for steam connection	
Windlass	Heating cable at the operating platform Cover with heating cable & fixed area steam connection Material of heating head : Cast steel Heating device for hydraulic oil in the HPT	
Boat thruster	Electric motor IP Grade up (IP55) HPT for pickle suits to be provided with a heater device	
Chain stopper	Cover with heating cable & fixed area steam connection	
Harvey pipe cover (P & S)	Cover with heating cable & fixed area steam connection above steel cover	
Storage box for pick-up gear (for E.T.S.)	Cover with heating cable	
Mooring fitting	All mooring fittings to be design approved by Class for ambient temperature of -45 °C The strictly essential for ambient temperature of -40 °C to be used for the mooring fittings	Extreme Low temp. : -45 °C

WINTERIZATION

✓ Arctic Specialties for Other Hull Outfitting Equipment

Equipment	Description	Remark
Accommodation Ladder	Cover with heating cable at the hoisting track retractable gear box: limit switch -Prime mover : Electric motor (explosion proof) driven	
Life raft (A/B - 20P x 4, Fwd - 4P x 1)	Cover with heating cable	
Access hatch & manhole	Material of packing: For blinged type weather tight hatch cover : Teflon For manhole cover : Viton	Extreme Low temp. : -45 °C
Mast, post and rigging	The suitable steel material for ambient temperature of -40 °C to be used for the all mast & post	Extreme Low temp. : -45 °C
Pilot ladder	Prime mover : Electric motor (explosion proof) driven -Aluminium leg	
Personal lifesavings, etc.	All personal lifesaving equipment to be class approval designed and verified by the manufacturer for use at ambient temperature -40 °C	Extreme Low temp. : -45 °C

WINTERIZATION

Stainless Steel Heating Coil
Maintain Temp. : 2 °C
Sea water Temp. : -2 °C
Ambient Air Temp. : -40 °C

Actuator mounted in cold(-45 °C) Chamber and Aero oil used for hydraulic system.

WINTERIZATION

Air Vent Head
Bull float type with electric heat tracing

Foam Insulation on weather deck
PIU: Foam insulation with electric heat tracing
- Fire and wash deck line
- Foam fire extinguishing line
- Fuel oil transfer line

Cast steel (LCB) body Teflon (RTFE) seat

De-icing on deck
Steam service line for deck machinery, cranes, unfold and cargo deck (as required)

WINTERIZATION

Living in Igloo ...

- 45 °C

- ✓ Intake Air Heating
- ✓ Warm Air Recirculation
- ✓ Space Heaters
- ✓ Thermal Insulation

WINTERIZATION

Arctic Sea Chest, to Go On Working in Ice

Winterization for Navigation Equipment

HEATING DOME
- INMARSAT C
- SASS
- GPS
- GLONASS
- IRIIDIUM

ELECTRIC WHISTLE

RADARS

HEATING DOME
Dome fitted a heater and inside dome will be kept -30deg.
Antenna itself can sustain up to -35 deg

ICE Navigation Aids

ICE Detection Radar

Xenon ICE Search Light

Ideal for navigation in ICE, particularly for securing and ice surveillance duty