



## SHIP HANDLING WITH ESCORT TUGS – A REFERENCE MANUAL FOR MASTERS & PILOTS

**Giano** tug is a new ultra compact ship handling Escort tugboat, specially designed to handle very large vessel (e.g. Neopanamax) in restricted spaces and locks. Giano tug is able to develop very large breaking and steering forces when connect in “**CENTER LEAD AFT**” **Escort position**, having being test in operation in the Escort position assisting ships up to **150.000 DWT**, and having been verified by LR under the criterions of the **IMO RESOLUTION MSC.415(97)Amendments to Part B of the International Code on Intact stability (2008 IS CODE)** for Ship Handling and Escort tugs that entered in force on 1<sup>st</sup> January 2020

### DESCRIPTION OF **Giano** tug

- 1) Double ended configuration giving total maneuverability on the XY axis, with intuitive in line azimuth controls. Transverse speed of 7 KN.(fig. 3 – 9 )
- 2) Double escort winches / tow points, positioned close to the rotation axis of the thrusters, giving the possibility to lever the tow rope remaining in the foot print of the vessel, applying full force and control to the tow sideways, at 0 speed.(fig.1)
- 3) Advanced patented design tunnel hull, reducing the interference between the 2 propellers. Double hull design for extra safety.
- 4) Improved stability with a GM of 3.6 m and a light displacement of 638 T.
- 5) Capability to push a vessel at full power alongside with no list in restricted spaces, (unlike conventional tractor tugs that can only push when at 90° to ship's keel) (fig.4)
- 6) Capability to keep a “PUSH-PULL” position/control while following a vessel at speed up to 6 Kn (Fig 9)

**Figure 1 :**  
Double ended Azimuthing Giano tug leveraging and steering a 300 m container carrier, remaining in the ship's foot print while thrusting sideways

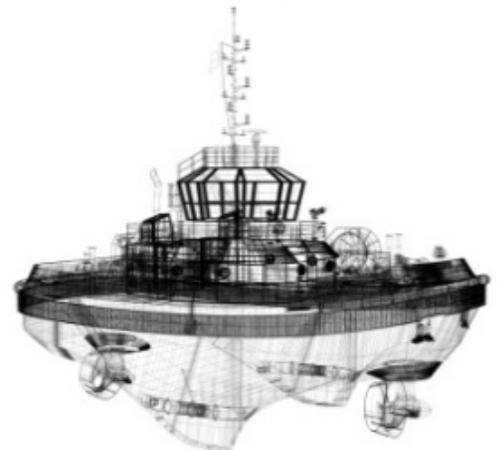




Figure 2 : Conventional Tractor tugs can only pull in straight line checking the ship's stern

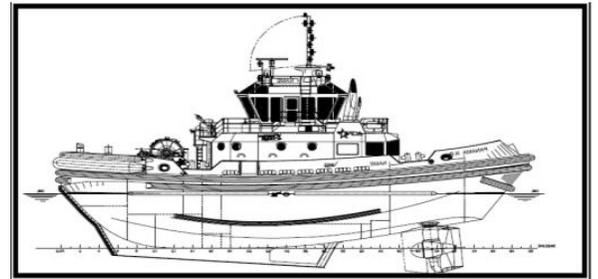
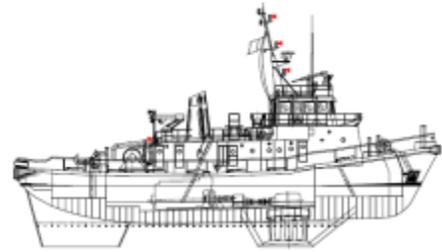


Figure 3 : Gianco tug side stepping at 7 KN with no list (undw body outlined)





Figure 4 : Giano tug trusting and pushing a vessel sideways at 0° list - EU Patent

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(87) International publication number: WO 2013/190583 (27.12.2013 Gazette 2013/52)

(54) IMPROVED HULL OF A TUGBOAT AND TUGBOAT COMPRISING SAID IMPROVED HULL  
 VERBESSERTER RUMPF EINES SCHLEPPERS UND SCHLEPPER MIT SOLCH EINEM RUMPF  
 COQUE PERFECTIONNÉE D'UN REMORQUEUR ET REMORQUEUR COMPORTANT LADITE  
 COQUE PERFECTIONNÉE

(84) Designated Contracting States: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

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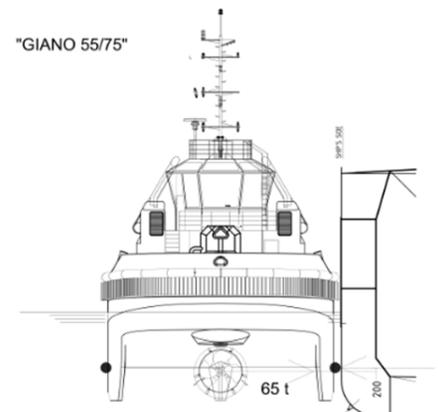
(43) Date of publication of application: 29.04.2015 Bulletin 2015/18

(56) References cited: WO-A1-03/091093 WO-A2-2011/139154 US-A- 3 750 607 US-A- 5 694 877

(73) Proprietor: Savona, Ugo



$$Tg \alpha = \frac{65 \text{ t} \times 0.2 \text{ m}}{700 \text{ t} (\Delta) \times 3.6 \text{ m} (\text{GM})} \quad \alpha = 0.0051^\circ$$





## INDIRECT TOWING – doing it safely

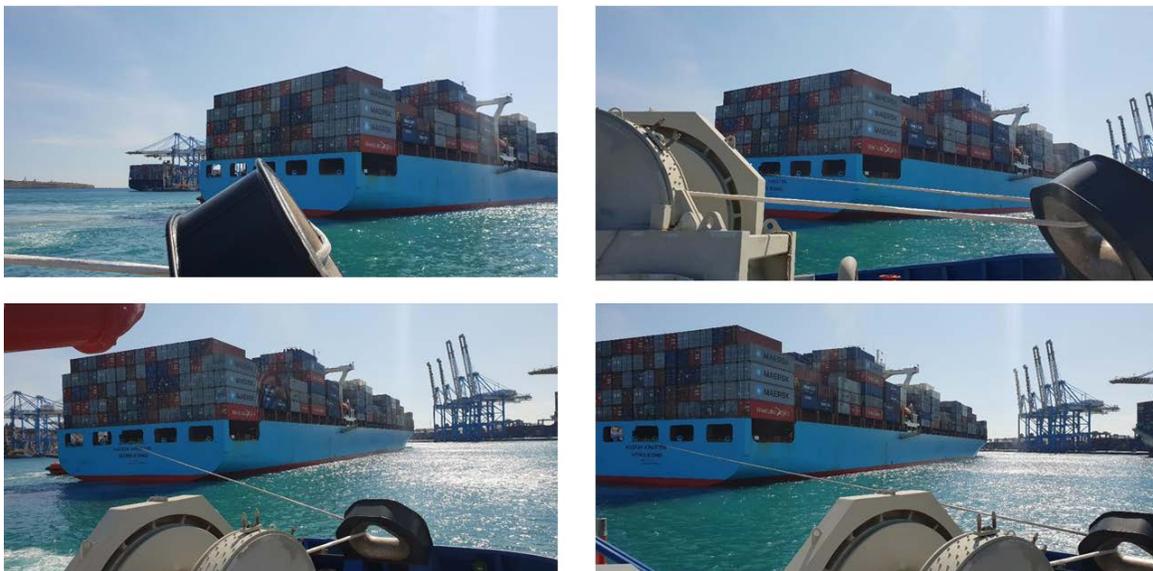


**The new IMO RESOLUTION MSC.415(97) Amendments to Part B of the International Code on Intact stability(2008 IS CODE)” Rev 1 dated 14 November 2017 – entered in force 1<sup>st</sup> January 2020 –**

Due to its peculiar propulsion and towing arrangement, the GIANO tug can safely operate in conditions that for conventional tugs are to be considered as accidental (eg. Caused by incorrect application of thrust by the tug). Giano tug has been extensively tested in operations escorting very large container carriers in Naples and Malta Free Port, among the busiest port in Mediterranean, in co-operations with local experienced Pilots (comments quoted) :

*Above all, our masters were somewhat impressed by the tug's stability which is mainly attributed to the innovative design of the hull. Whilst operating the tug in the indirect mode at very high escort angles, the healing angle was noted to be considerably less than what would be experienced with an azimuth stern drive tug. In actual fact, our masters stated that they would never attempt to carry-out indirect towing at such high escort angles at speeds of 8 knots or above. In this regard, it is considered that tug Giano can reach very high steering and braking forces whilst towing in the indirect mode without compromising the stability of the tug and without healing too much thus making it more safe for the crew and for the tug. One has to appreciate that tug Giano's total propulsive power is 3356 kW and the static bollard pull capacity is around 60 tonnes. However, these limitations staged due to the size and power of this tug are somewhat offset when towing in the indirect mode. High steering force cannot be achieved by the drive thrust alone and must therefore be generated by the combined thrusters force together with an additional hydro-dynamical force. The main component of this hydro-dynamical force is generated by this indirect mode. The longitudinal lateral area of the hull of this tug helps create these elevated steering and braking forces, however one has to keep in mind that these hydro-dynamic forces can only be generated at higher manoeuvring speeds and thus will have no effect whatsoever when the vessel is approaching its berth at lower speeds. Escort tugs are normally designed and built with the towing point as low as possible in order not to compromise the stability of the tug. Tug Giano's added advantage is that due to its high reserve stability, the tow point is not placed so low and thus the tow line lead is somewhat in line with the towing winch drum thus reducing undue stress on the tow line.*

**Figure 5 : Sequence of indirect power steering of a 80.000 DWT 300m x 40 m Container ship)**





**GIANO tug has been verified by LR satisfying the criteria of MSC 415(97) self tripping and Escort rules .**



**“GIANO”  
Escort Tug**



To support the numerical calculation with a proof test at sea of the real capacity of Giano tug to thrust athwart ship under full BP, a Bollard Pull experiment athwart ship was conducted on the 3<sup>rd</sup> November 2017 and the results witnessed and validated by the LR surveyor for 65.2 Tonnes of force and an average inclination of 10.16°. This peculiar bollard pull athwart ship test can be considered also an experimental verification of the stability capabilities of the Giano tug when assisting a ship in Indirect Escort mode.

**Figure 6 : Giano tug during transverse BP test at sea with 65 Tonnes thrust and 10° list only**

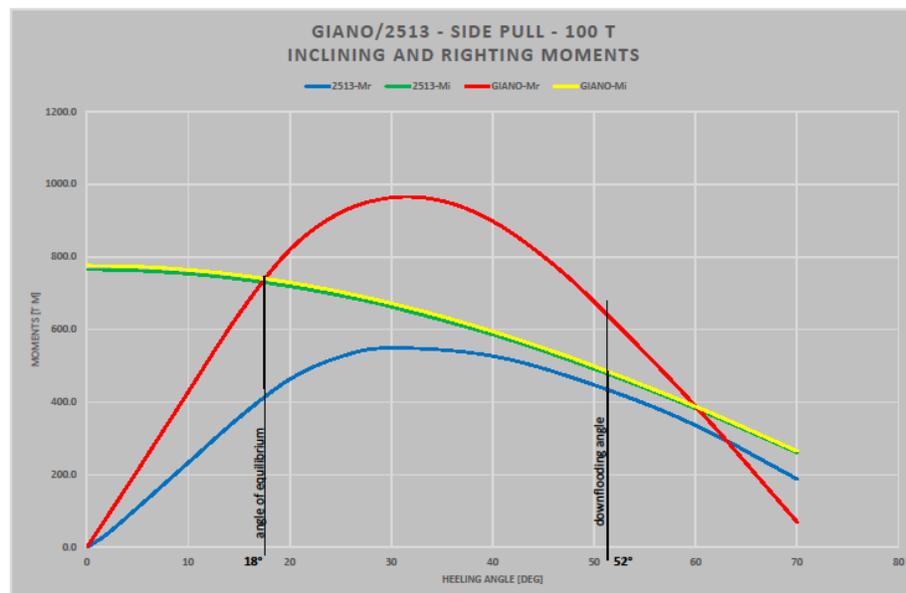




Giano tug is able to develop a very high steering forces when connected at “Center Lead Aft” position, both at arrival and departure of large ships. Giano tug can operate safely, in indirect escort mode, at an angle that it may cause the girting of majority of tugs, for lack of transversal stability. This is due to 2 main factors :

- Transversal stability between 2 and 3 times the conventional ASD/T tractor tug in service
- Propulsion at both ends that will allow not only a total control of tug's position, but also will increase the hydrodynamic forces created during the indirect escort mode, adding to the drag of the hull and appendices, the steering power applied directly on the hawser by the forward thruster, which has the rotation axis positioned about 1 m from the forward tow point. This gives Giano tug the ability of levering the tow without a negative lever arm, at any speed from 0 to 10 Kn. Giano tug operate safely with a list of  $18^\circ$  under the inclining moment created by 100 T BP forces athwartship ( $90^\circ$ ). This can be considered a limit condition for ship-handling tugboats.
- (see fig 7 stability comparison with an industry leader's compact 2513 ASD tug)

Fig. 7



## ESCORT TRANSVERSE POWER BRAKING

A valuable feature of Giano tug when assisting very large ships like the new 20.000 TEU, is that when it is positioned at “Center Lead Aft” and the Pilot requires to reduce the ship's speed at the entrance of the harbour for an emergency manouvre, Giano tug's Skipper can effectively and safely brake the convoy by transversing the thrust at full power, consequently turning the tug at  $90^\circ$ . It must be noted that the braking power on the tow line can exceed the 100 T with the tug listing up to  $15^\circ$  to Stb/Pt with the ship's speed consequently reduced in matter of seconds.

(see fig 8 Escort Power Braking of a 150.000 DWT Container carrier )

Fig 8





**Fig 9**  
**360° towing power - Controlling and checking the tow while on Push - Pull mode –**

Giano tug is III generation “Double Ended” azimuth tugboat of exceptional maneuverability, with the unique ability to stay at a constant distance from the tow, sidestepping in transverse position (90°) while the ship is moving ahead, in / out of the harbor, at speed up to 6 Kn, ready, on Pilot’s command, to push-pull.

Giano tug is able to check the stern of the tow in push-pull mode instantly, because always in the right position to do so. This capacity is particularly useful during towing in restricted spaces. Any other tugboat ASD or Voith Tractor cannot do this because their side stepping speed is limited to Max 3 Kn.

Fig 9 : Push-Pull during a tow out - side stepping speed > 5 Kn - 360° maneuverability



**REFERENCE VIDEOS :**

GIANO TUG ESCORTING MADE SAFE : <https://www.youtube.com/watch?v=uUoVYx15fg8&t=77s>

THE III GENERATION TUGS ARE HERE : <https://www.youtube.com/watch?v=RhM5xWGqAPI>

GIANO LEVERING A 300 M CONTAINER VESSEL : <https://youtu.be/fPJSJHGuyvk>

GIANO INDIRECT ECORT MAX ANGLE SAFE CLOSE QUARTER : <https://youtu.be/wiW3SGXLcPg>

# PURPLE WATER TOWING LTD

DUBLIN PORT TOWAGE AND ESCORT LICENSED SERVICES (UK STC)

**4500 HP – 60 T BP DOUBLE ENDED AZIMUTH TUG “ GIANO ”**  
**British Flag- Port of Registry : London - O.N. 9920395 –**  
**IMO N. 9674610 – CALL SIGN : 2IDN5**



**LENGHT O.A. :** 25,14 m  
**LENGHT P.P. :** 23,99 m  
**WIDTH :** 13,02 m  
**MOULD.DEPTH (from baseline) :** 3,65 m  
**MAX. DRAFT :** 5,40 m  
**GRT :** 272,33  
**SPEED :** 11,5 Kn ahead-astern- 7Kn transverse -  
**ENGINES :** 2 CAT 3512 C HD 1678 KW AT 1800R.P.M –Total 3358 KW  
**PROPULSION :** 2 X SCHOTTEL SRP 3000 CP IN LINE  
**BOLLARD PULL LR certified :** 63 Tons AHEAD, 59 TONS ASTERN,- 65 TONS TRANSVERSE with 10° list-  
**CLASS :** LR ⌘ 100A1 ESCORT TUG – **FI.FI. SHIP1 (2400 MC3/H) – water spray -**  
**NAVIGATION :** LR UNRESTRICTED – MCA Class 1 -  
**YEAR OF BUILT :** 2015 - Last dry dock July 2019  
**TOW WICH AFT :** 75 T PULL 190 T STAT. LOAD 150 M X 52 mm DYNEEMA 220 T MBL  
**TOW WICH FORE:** 75 T PULL 190 T STAT. LOAD 150 M X 52 mm DYNEEMA 220 T MBL  
**G.O. :** 70 m3  
**FRESH WATER :** 60 m3  
**NAV AIDS :** 2x Radar Furuno- NET NAV plotter – GMDSS zone 2  
**MAX BOLLARD PULL FOR WICH IMO RESOLUTION MSC.415 (97) 2008 IS Code for Escort tugs – SELF TRIPPING –**  
**CRITERION IS SATISFIED : 130 T**



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