PIANC Report No. WG180

Guidelines for protecting berthing structures from scour caused by ships

Report Date: 2015 Revision No. (n/a)

Corrigenda Sheet_v1.0

Page No.	Section No.	Comment	Amendment
59	8.1 Figure 8.1	In order to avoid confusion and for consistency with the formulae presented in this publication, some labels shall be replaced in the Figure.	Replace in the Figure "$d_{thruster}$" with " $D_{thruster}$ " and "h_t" with "$h_{thruster}$"
60	8.1 Figure 8.2	In order to avoid confusion and for consistency with the formulae presented in this publication, some labels shall be replaced in the Figure.	Replace in the Figure "$d_{thruster}$" with " $D_{thruster}$ "
63, 64 and 66	Equation 8-6, 8-7, 8-8, 8-9, 8-10 and 8-17	The exponent in the formula shall be1/3 as per original paper Blaauw & Van de Kaa (1978).	Replace the exponent in the formula with 1/3.
63	Equation 8-6		$P_{thruster}$ and ρ_w should be inserted in W and kg/m^3, with D_p in m (see Equation 8-4)
64	Equation 8-10		$P_{thruster}$ and ρ_w should be inserted in W and kg/m^3, with $D_{thruster}$ in m
64	Equation 8-10		Replace coefficient 1.15 by 1.17
66	Dutch method	No formula for calculating velocities on the slope is provided	Will be included in V2.0 of the report
67	Line 2 definition of parameter “A”	If $D_o=D_p$/sqrt(2) according to Blaauw & Van der Ka 1978, then the coefficient 1.95 should be 1.98, which can better be rounded off to 2.0 instead of 1.95.	Replace 1.95 with 1.98.
67	Figure 8.7	In order to avoid confusion and for consistency	Replace in the Figure "D_p" with " $D_{thruster}$ "

		with the formulae presented in this publication, some labels shall be replaced in the Figure.	
67	8.2.2.3		Replace [Drewes, BAW, Römisch] by (Römisch,2001) and (Römisch & Schmidt, 2012)
71	Section 8.2.3, Figure 8.14		Delete top figure
72	Section 8.3.1, line 8		Replace the protective scour system By the protective system
72	Figure 8.15	In order to avoid confusion and for consistency with the formulae presented in this publication, some labels shall be replaced in the Figure.	Replace in the Figure "$d_{thruster}$" with "D_p" and "h_t" with "h_p".
73	Equation 8-26	The exponent in the formula shall be1/3 as per original paper Blaauw & Van de Kaa (1978).	Replace the exponent in the formula with 1/3.
74	Equation 8-31	Inconsistency with formula presented in Römisch, K. (1993)	Replace 0.061 with 0.161.
74	Last line		Replace 13 degrees By Up to 2.5 degrees
75	Line 2	Inconsistency with Equation 8-35. If $D_o=D_p/\text{sqrt}(2)$ according to Blaauw & Van de Kaa (1978), then the coefficient 1.95 should be 1.98.	Replace 1.95 with 1.98.
76	Section 8.3.4.1		Equation 8-39 should read $V_{axis} = 12.4\, V_0\, (A_0 / x)^{+1.17}$
78	Section 8.3.4.3		Equation 8-46 should read:

			$V_0 = 1,53\left(\frac{f_P P_{main}}{\rho_w D_p^2}\right)^{\frac{1}{3}}\left(\frac{\frac{1}{4}\pi D_p^2}{(n_o bh)\cos(\gamma)}\right)$
81	Section 8.3.5.2		Replace 12% By 12 degrees
96	Bottom of page		Replace Roubos (2007) presented a method taking into account the uncertainties in the design of the bottom protection near quay walls. By Roubos (2007) presented a method taking into account the uncertainties in the design of the bottom protection near quay walls for main propeller systems according to the Dutch method (see equations 8-35 to 8-37)
97	Equation 10-1		Equation 10-1 should read $S_{thruster} = V_{bed,\max} = \frac{(0.2to0.3)C_3}{h_p}\left(\frac{f_p P_D D_p}{\rho_w}\right)^{1/3}$
97	Equation 10-2		Equation 10-2 should read $R_{thruster} = V_{bed,cr} = B_{cr}\sqrt{\frac{2g(\rho_s - \rho_w)D_{50}}{\rho_w}}$
97	Line 21		Replace Equation 10-1 is a combination of and Equation 8-37… By Equation 10-1 is a combination of Equation 8-26 and Equation 8-37…

100	Section 10.2.1.1, Figure 10.3		Delete left figure
108	Line 9 (in case of a propeller jet..)	Replace word	Replace “propeller” with “Transverse Thrusters”.
108	Line 9	Replace sentence	Replace “Also BAW (2005) presents a method to take into account the slope angle” with “The German approach includes allowance for the effect of the bank slope in line with the jet and perpendicular to the line of the jet. Details are given in Section 6.3.1 of BAW (2010).”
109	Line 16		Remove: $K_h = 33/\Lambda_h$
111	Text above Figure 10.11	Incorrect use of k_t^2 in CIRIA, CUR, CETMEF (2007)	Replace: “The given relationship between turbulence intensity and turbulence factor (see above) results in $kt^2 = 2.5$ (between 2.1 and 2.9), for turbulence intensities of 0.35 (respectively 0.30 and 0.40). These values are significantly lower than the turbulence factor kt2 = 5.2 to kt2 = 6 as proposed in CIRIA, CUR, CETMEF (2007). The values in CIRIA, CUR, CETMEF (2007) are not based on turbulence measurements, but on measurements of stone stability in combination with a current velocity calculated with the Dutch formulas. It should be noticed that the current velocity near the bottom calculated with the Dutch formulas is smaller than the actual velocity near the bottom, because the Dutch formulas do not take into account the influence of confinement of the radial jet expansion by the bottom (and the rudder). This underestimation of the actual velocity must be compensated with a larger value of (1/ Bcrit,Iz)2 in Equation 10-26 and a larger value of kt^2 in Equation 10-27. When designing a stone size

			using the Dutch formulas, it is recommended to use $kt^2 = 5.2$ to $kt^2 = 6$ as proposed in CIRIA, CUR, CETMEF (2007). When designing relatively impermeable scour protection types such as in situ concrete mattress or fully grouted rock, the method described in section 10.4 should be preferred to take into account the suction generated under a propeller." By: "The given relationship between turbulence intensity and turbulence factor (see above) results in $k_t^2 = 2.5$ (between 2.1 and 2.9), for turbulence intensities of 0.35 (respectively 0.30 and 0.40). These values are significantly lower than the turbulence factor $k_t^2 = 5.2$ to $k_t^2 = 6$ as proposed in (CIRIA, CUR, CETMEF, 2007). These values are meant to be used in Equation 5.226 in CIRIA, CUR, CETMEF (2007) and not in the Pilarczyk Equation 10-27. In this equation the values for k_t^2 read $k_t^2 = 3.0$ or $k_t^2 = 4.0$ and which are not mentioned in CIRIA, CUR, CETMEF (2007). Nevertheless, it should be noticed that the current velocity near the bottom calculated with the Dutch formulas is smaller than the actual velocity near the bottom, because the Dutch formulas do not take into account the influence of confinement of the radial jet expansion by the bottom (and the rudder). This underestimation of the actual velocity can be compensated with a safety factor. When designing relatively impermeable scour protection types such as in situ concrete mattress or fully grouted rock, the method described in section 10.4 should be preferred to take into account the suction generated under a propeller."

127			Insert reference Römisch, K. (2001): “Scouring in front of quay walls caused by bow thruster and new measures fir its reduction.” Vth Intern. Seminar on renovation and improvements to existing quay structures, Gdansk