

# Explanatory note – “White”, “Grey” and “Black List”

The normative listing of Flags provides an independent categorization that has been prepared on the basis of Paris MoU port State inspection results over a 3-year period, based on binomial calculus.

The performance of each Flag is calculated using a standard formula for statistical calculations in which certain values have been fixed in accordance with agreed Paris MoU policy. Two limits have been included in the System, the ‘black to grey’ and the ‘Grey to white’ limit, each with its own specific formula:

$$u_{black\_to\_grey} = N \cdot p + 0.5 + z \cdot \sqrt{N \cdot p \cdot (1-p)}$$

$$u_{white\_to\_grey} = N \cdot p - 0.5 - z \cdot \sqrt{N \cdot p \cdot (1-p)}$$

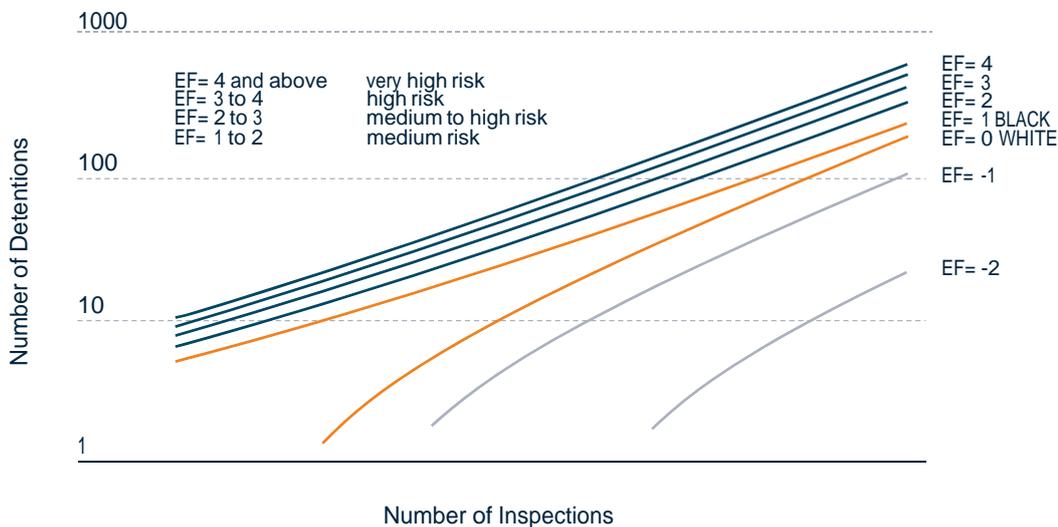
In the formula “N” is the number of inspections, “p” is the allowable detention limit (yardstick), set to 7% by the Paris MoU Port State Control Committee, and “z” is the significance requested (z=1.645 for a statistically acceptable certainty level of 95%). The result “u” is the allowed number of detentions for either the black or white list. The “u” results can be found in the table. A number of detentions

above this ‘black to grey’ limit means significantly worse than average, where a number of detentions below the ‘grey to white’ limit means significantly better than average. When the amount of detentions for a particular Flag is positioned between the two, the Flag will find itself on the grey list. The formula is applicable for sample sizes of 30 or more inspections over a 3-year period.

To sort results on the black or white list, simply alter the target and repeat the calculation. Flags which are still significantly above this second target, are worse than the flags which are not. This process can be repeated to create as many refinements as desired. (Of course the maximum detention rate remains 100%) To make the flags’ performance comparable, the excess factor (EF) is introduced. Each incremental or decremental

step corresponds with one whole EF-point of difference. Thus the EF is an indication for the number of times the yardstick has to be altered and recalculated. Once the excess factor is determined for all flags, the flags can be ordered by EF. The excess factor can be found in the last column of the White, Grey or Black list. The target (yardstick) has been set on 7% and the size of the increment and decrement on 3%. The White/Grey/Black lists have been calculated in accordance with the principles above.

The graphical representation of the system below is showing the direct relations between the number of inspected ships and the number of detentions. Both axes have a logarithmic character as the ‘black to grey’ or the ‘grey to white’ limit.



# Explanatory note – “White”, “Grey” and “Black List”

## Example flag on Black list:

Ships of Flag A were subject to 108 inspections of which 25 resulted in a detention. The “black to grey limit” is 12 detentions. The excess factor is 4.26.

$N$  = total inspections

$P$  = 7%

$Q$  = 3%

$Z$  = 1.645

How to determine the black to grey limit:

$$\mu_{blackto\ grey} = N \cdot p + 0.5 + z \cdot \sqrt{N \cdot p \cdot (1-p)}$$

$$\mu_{blackto\ grey} = 108 \cdot 0.07 + 0.5 + 1.645 \cdot \sqrt{108 \cdot 0.07 \cdot 0.93}$$

$$\mu_{blackto\ grey} = 12$$

The excess factor is 4.26. This means that ‘p’ has to be adjusted in the formula. The black to grey limit has an excess factor of 1. so to determine the new value for ‘p’. ‘q’ has to be multiplied with 3.26 and the outcome has to be added to the normal value for ‘p’:

$$p + 3,26q = 0,07 + (3,26 \cdot 0,03) = 0,1678$$

$$\mu_{excess\ factor} = 108 \cdot 0.1678 + 0.5 + 1.645 \cdot \sqrt{108 \cdot 0.1678 \cdot 0.8322}$$

$$\mu_{excess\ factor} = 25$$

## Example flag on Grey list:

Ships of Flag B were subject to 141 inspections. of which 10 resulted in a detention. The ‘black to grey limit’ is 15 and the “grey to white limit” is 4. The excess factor is 0.51. How to determine the black to grey limit:

$$\mu_{blackto\ grey} = 141 \cdot 0.07 + 0.5 + 1.645 \cdot \sqrt{141 \cdot 0.07 \cdot 0.93}$$

$$\mu_{blackto\ grey} = 15$$

How to determine the grey to white limit:

$$\mu_{greyto\ white} = N \cdot p - 0.5 - z \cdot \sqrt{N \cdot p \cdot (1-p)}$$

$$\mu_{greyto\ white} = 141 \cdot 0.07 - 0.5 - 1.645 \cdot \sqrt{141 \cdot 0.07 \cdot 0.93}$$

$$\mu_{greyto\ white} = 4$$

To determine the excess factor the following formula is used:  $ef$  = Detentions – grey to white limit / grey to black limit – grey to white limit

$$ef = (10 - 4) / (15 - 4)$$

$$ef = 0,51$$

## Example flag on White list:

Ships of Flag C were subject to 297 inspections of which 11 resulted in detention. The “grey to white limit” is 13 detentions. The excess factor is –0.28. How to determine the grey to white limit:

$$\mu_{greyto\ white} = N \cdot p - 0,5 - z \cdot \sqrt{N \cdot p \cdot (1-p)}$$

$$\mu_{greyto\ white} = 297 \cdot 0.07 - 0.5 - 1.645 \cdot \sqrt{297 \cdot 0.07 \cdot 0.93}$$

$$\mu_{greyto\ white} = 13$$

The excess factor is -0.28 This means that ‘p’ has to be adjusted in the formula. The grey to white limit has an excess factor of 0. so to determine the new value for ‘p’. ‘q’ has to be multiplied with –0.28. and the outcome has to be added to the normal value for ‘p’:

$$p + (-0.28q) = 0.07 + (-0.28 \cdot 0.03) = 0.0616$$

$$\mu_{excess\ factor} = 297 \cdot 0.0616 - 0.5 - 1.645 \cdot \sqrt{297 \cdot 0.0616 \cdot 0.9384}$$

$$\mu_{excess\ factor} = 11$$

# Explanatory note – “Commitment”

**Commitment:**

Member States of the Paris MoU are committed to perform inspections according to the inspection and selection scheme as defined in Annexes 8 and 11 of Paris Memorandum of Understanding. The number of inspections relevant for this commitment is calculated accordingly.