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| А | 7750            |  | TO IS027   |  | Execution   | n Mo  | aterial  | Cylinder   | r   | Attribu<br>Engine e:   |   |   | Attribu<br>Stays   |  | )   |                                  |          |
|   | GROUP 0         | IS08015  | ACCORDING 1  |  | No.   |   | ID   | No.  |   | NDARD  | LEFT  | FUEL PUM<br>SIDE  |  | AUST<br>DE   | BOT<br>SIDE   |                                  |          |
|   | SEE             |  | ACCC   |  | 001   | PTAA  | 4030761  | 6-12   |   | Χ  |   | X   |  |  |   |                                  |          |
|   |                 | PRINCIPLE  | NCES   |  | 002   | PTAA  | 4030760  | 6-12   |   | Χ  |   |   |  | X  |   |                                  |          |
|   | PROTECTION      |  | TOLERANCES   |  | 003   | PTAA  | 4030759  | 6-12   |   | Χ  |   |   |  |  | Χ   |                                  |          |
| В | SURFACE PR      | TOLERANCING  | GENERAL TO   |  |   |   |  |  |   |  |   |   |  |  |   |                                  | E        |
| С |                 | NO   | TF   |  |   |   |  |  |   |  |   |   |  |  |   |                                  | C        |
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| E | Change History  |  |  |  |   |   |  |  |   |  |   |   |  |  |   |                                  | <br>     |
|   | Char            | _  | tch  | 101  | yzh102  | 02.06.2022  | CNAA001986   | Main   | Design  | Drawing  | g Introdu   | ıced  |  |  |   | -                                | - -      |
|   |                 | Rev  | . Crea   | ator   | Approver  | Approval Date   | Change ID  | Change S   | ynopsis   |  |   |   | Approve  | ed Activit   | y Code  | Е                                | С        |
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| F | Copyr<br>By tak | ight W<br>ing po<br>onours                                 | ssessior<br>these ri   | n of the<br>ights. N   | leither the who <b>l</b> e  | ights reserved.<br>ipient recognizes<br>nor any part  | Main   | 11791  | Design<br>Group   |  | 9715  | Q-Code X  | ××××   | Stand  |   |                                  | DS F     |
|   | fabricany w     | ation, r<br>ay nor   | narketin<br>made a   | g or ar<br>ccessib   | d in any way for one<br>my other purpose<br>ole to third parties<br>Winterthur Gas                              | nor copied in<br>s without the  | Qty<br>per   |  | I /\ /. I   | tem<br>D   | Ρ.  | TA A 0 3 0  | 769  | Draw<br>Page   |   | /                                | /1       |
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| SEQ<br>NO                  | QTY                         | / Item ID   |   | Item Name                                      |                                  |                 |                 | Dimension | Standard-I D |      | Basic Material |               |        | Net<br>Weight |
|----------------------------|-----------------------------|---|---|--|----------------------------------|-----------------|-----------------|-----------|--------------|------|----------------|---------------|--------|---------------|
| 001                        | 1                           | PTAA0   | 30750   | ENGINE ST                                      | TAYS                             |                 |                 | FS, STD   |              |      |                |               |        | 0.001         |
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|                            |                             |   |   |  |                                  |                 |                 |           |              |      |                |               |        |               |
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| .                          |                             | 678010  | 1,11,12 X92DF                                       | 2 0  |                                  |                 |                 |           |              | T    |                |               |        |               |
| Prod.                      |                             | 0,1,0,0,1.0   | ,,  |  |                                  |                 |                 |           |              |      |                |               |        |               |
| ony                        |                             |   |   |  |                                  |                 |                 |           |              |      |                |               |        |               |
| Change History             |                             |   |   |  |                                  |                 |                 |           |              |      |                |               |        |               |
| Ö                          | -                           | sde101  | yzh102  |  |                                  | new Docum       | ent             |           |              |      |                |               |        |               |
|                            | _                           |   |   | l  |                                  |                 |                 |           |              |      | ^~~~ ~~l       |               | -      |               |
|                            | Rev.                        | Creator   | Approver  | Approval Date                                  | Change ID                        | Change Synopsis |                 |           |              | /    | Approved       | Activity Code | E      | -<br>C        |
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|                            | V                           | <b>VII</b><br>Interthu                                      | VC  | Diesel   |                                  |                 |                 |           |              |      | Approved       | Activity Code |        |               |
| By ta                      | Wi                          | Mill (  mterthur Gas  possession                            | or Gas &  Of Materia  & Diesel Ltd  of the docur    | Diesel  al  All rights reservement the recipie | ENGII  Dimension  ed. Units      | NE ST           | AYS             |           | 25.5         |      |                | Net Weight    | Е 0    | .001          |
| By ta<br>recogni<br>any na | winght Winking lizes and of | Bill Contenthur Gas possession and honours to this document | of Materia & Diesel Ltd of the docum hese rights. N | Diesel  al                                     | Dimension  Ed. Units Main Design | NE ST           | Material  Group |           | 9715 Q-Q     | Code | XXXXXX         | Net Weight    | 0<br>V | С             |

# Side Exhaust Fuel Free End D-D--D--

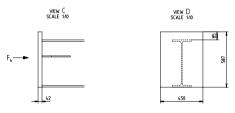
Driving End

\* Only for 11 and 12 cylinders.

### Position of stay attachment points on engine / platform side

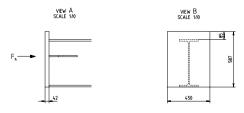
| No. of<br>Cyl. | CrankshaftParts | Α   | В   | С    | D    |
|----------------|-----------------|-----|-----|------|------|
| 8              | 1               | 795 | 795 | 2385 | 2385 |
| o              | 2               | 795 | 832 | 2385 | 2496 |
| 9              | 2               | 795 | 832 | 2385 | 2496 |
| 10             | 2               | 795 | 832 | 2385 | 2496 |
| 11             | 2               | 795 | 832 | 2385 | 2496 |
| 12             | 2               | 795 | 832 | 2385 | 2496 |

### Layout / Specification of "inner" stay platform attachment points



| Max. permissible force in lateral direction | F,   | (kN)  | ± 200     |
|---|------|-------|-----------|
| Stiffness                                   | k    | (N/m) | 0.6 x 10° |
| Permissible vertical stays displacement     | Def, | (mm)  | ± 50      |
| Permissible horizontal stays displacement   | Def, | (mm)  | ± 50      |
| Permissible angular stays displacement      | Def_ | (°)   | 2         |

Layout / Specification of "outer" stay platform attachment points



| Max. permissible force in lateral direction | F,   | (kN)  | ± 200     |
|---|------|-------|-----------|
| Stiffness                                   | k    | (N/m) | 0.6 x 10° |
| Permissible vertical stays displacement     | Def, | (mm)  | ± 50      |
| Permissible horizontal stays displacement   | Def, | (mm)  | ± 50      |
| Permissible angular stays displacement      | Def. | (°)   | 2         |

### Requirements for application of hydraulic stays on fuel side

- The selected stays must have maker's acceptance for one side engine installation. WinGD approved supplier : Green & Clean Technology Co., Ltd (Korea) Hanmi Hydraulic Machinery Co., Ltd (Korea) Nantong Navigation Machinery Group Co., Ltd (China)
- Installed on fuel side (FS).
- The amount of stays must be determined based on the requirement and stays suppliers specification. The transferred forces must be taken into consideration.
- The engine forces and moments are defined in the relevant engine dynamic data. The engine forces and moments are defined in the relevant engine dynamic data sheet "Forces and Moments" which is linked in the Marine Installation Manual (MIM). Stay pre-lensioning forces (max. piston hydraulic force) must also be considered and are provided. by the stays supplier.
- The stay attachment point requirements must be crosschecked with the specification. The maximum forces transferred by the selected stays type must be within the range as defined on this drawing for standard engine execution. If the total force per stay exceeds the permissible range, reinforcement of the platform attachment points can be requested from the engine builder.
- The stays must adapt to the ship hull deformation and reduce the static reaction force acting on the engine and ship hull attachment points.
- The stays must increase the total stiffness of the system to avoid harmful resonance conditions. The dynamic stiffness of the stays (dynamic spring rate) is provided by the
- The stays must dampen accordingly to ensure that the acceptable vibrations (RMS limits) for the WinGD 2-stroke engine are met.
- The performance of the stays must be checked during sea trial by vibration measurements.
- Stay position in the vertical direction, respectively the distance to the bottom side of the upper platform beam must be arranged in a way that sufficient space for welding and application of the max. admissible stays inclination remains.
- The installation and commissioning of the stays must be in accordance with the supplier's instructions.

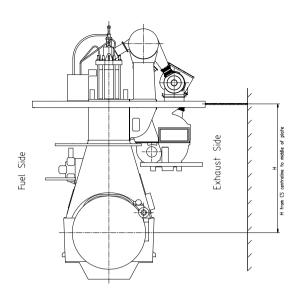
### Requirements on stays attachment points at ship hull side (per engine stay)

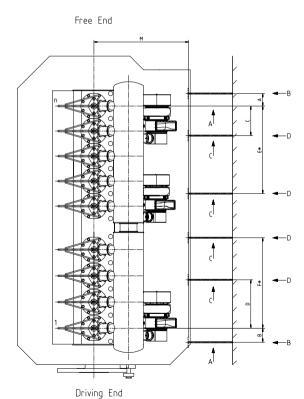
| Max. force acting on ship's hull  | Fh <sub>max</sub>  | (kN)  | <del>×</del> 1) |
|-----------------------------------|--------------------|-------|-----------------|
| Minimum stiffness                 | k <sub>nin.</sub>  | (N/m) | 0.5 x 10°       |
| Permissible deflection per 100 kN | Def <sub>max</sub> | (mm)  | 0.2             |

\*1) Maximum engine force resulting from lateral moments of X/H type at the project specific rating plus stays pre-tensioning force according to stays supplier's specification



| SEQ                                   | QT\                         | / Item ID  |   | Item Name  |                                      |                           |                 |           |        |         | Standard-I D | Basic Material  |               |   | Net         |
|---------------------------------------|-----------------------------|--|---|--|--------------------------------------|---------------------------|-----------------|-----------|--------|---------|--------------|-----------------|---------------|---|-------------|
| NO 001                                | 1                           | PTAA0  | 2075/   | ENGINE   | STAYS                                |                           |                 |           | Din    | nension |              |                 |               |   | Weight<br>0 |
| 001                                   | I                           | FIAAU  | 30734   |  |                                      |                           |                 |           | ES     | s, STD  |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
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|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
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|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
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|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
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|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
| Prod.                                 |                             | 6,7,8,9,10   | ),11,12 X92DF   | -2.0   |                                      |                           |                 |           |        |         |              |                 |               |   |             |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
| listory                               |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
| Change History                        |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   |             |
| 0                                     | <b>-</b>                    | sde101   | -   | 0206202  |                                      | <b>MX001896</b>           | new Do          |           |        |         |              | A               |               | - | -           |
|                                       | Rev.                        | Creator  | Approver  | Approval Date  | C                                    | hange ID                  | Change Sy       | nopsis    |        |         |              | Approved        | Activity Code | Е | _           |
|                                       | 1/                          | <b>M</b>   | V   | <b>5</b> 0   |                                      | ENGI                      | VE S            | STA       | AYS    |         |              |                 |               |   | С           |
|                                       |                             |  |   |  |                                      |                           |                 |           |        |         |              |                 |               |   | С           |
|                                       |                             |  | ır Gas 8  |  |                                      |                           |                 |           |        |         |              |                 |               |   | С           |
|                                       |                             | nterthu  | ır Gas 8  | Diesel   |                                      |                           |                 |           |        |         |              |                 |               |   | C           |
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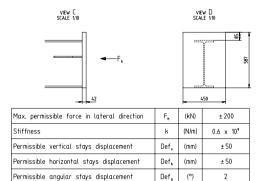


Position of stay attachment points on engine / platform side

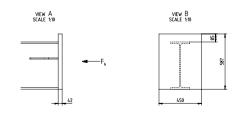
|   | No. of<br>Cyl. | CrankshaftParts | Turbocharger<br>type | HP-SCR<br>Interface | А   | В   | С    | D    | E*   | F*   | М    | Н    |
|---|----------------|-----------------|----------------------|---------------------|-----|-----|------|------|------|------|------|------|
|   | 8              | 1               | 2 x MET83MB          | Without             | 855 | 855 | 795  | 1301 | -    | -    | 6175 | 8175 |
|   | "              | 2               | 2 x MET83MB          | Without             | 855 | 892 | 795  | 1412 | -    | -    | 6175 | 8175 |
|   |                | 2               | 2 x MET71MB          | Without             | 855 | 892 | 795  | 1412 | -    | -    | 6175 | 8175 |
| A |                | 2               | 2 x A280-L           | Without             | 855 | 892 | 795  | 1412 | -    | -    | 6175 | 8175 |
| A | 9              | 2               | 2 x MET83MB          | Without             | 855 | 892 | 795  | 1412 | -    | -    | 6175 | 8175 |
|   |                | 2               | 3 x MET66MB          | Without             | 795 | 892 | 1579 | 1712 | -    | -    | 6175 | 8175 |
| A |                | 2               | 3 x A275-L           | Without             | 795 | 892 | 1579 | 1712 | -    | -    | 6175 | 8175 |
|   |                | 2               | 3 x MET66MB          | Without             | 795 | 892 | 1879 | 1412 | -    | -    | 6175 | 8175 |
|   | 10             | 2               | 3 x MET83MB          | Without             | 795 | 892 | 1879 | 1412 | -    | -    | 6175 | 8175 |
|   |                | 2               | 3 x MET71MB          | Without             | 795 | 892 | 1879 | 1412 | -    | -    | 6175 | 8175 |
|   | 11             | 2               | 3 x MET71MB          | Without             | 795 | 892 | 1879 | 1412 | 5565 | 4086 | 6175 | 8175 |
|   | 12             | 2               | 3 x MET83MB          | Without             | 795 | 892 | 1879 | 3076 | 5565 | 5750 | 6175 | 8175 |
|   |                | ·               |                      |                     |     |     |      |      |      |      |      |      |

\* Only for 11 and 12 cylinders.

Layout / specification of "inner" stay attachment points



### Layout / specification of "outer" stay attachment points



| Max. permissible force in lateral direction | F,   | (kN)  | ± 200     |
|---|------|-------|-----------|
| Stiffness                                   | k    | (N/m) | 0.6 x 10° |
| Permissible vertical stays displacement     | Def, | (mm)  | ± 50      |
| Permissible horizontal stays displacement   | Def, | (mm)  | ± 50      |
| Permissible angular stays displacement      | Def. | (°)   | 2         |

### Requirements for application of hydraulic stays on exhaust side

- The selected stays must have maker's acceptance for one side engine installation. WinGD approved supplier : Green & Clean Technology Co., Ltd (Korea) Hannii Hydraulic Machinery Co., Ltd (Korea) Nantong Navigation Machinery Group Co., Ltd (China)
- Installed on exhaust side (ES).
- The amount of stays must be determined based on the requirement and stays suppliers specification.

The transferred forces must be taken into consideration.

The engine forces and moments are defined in the relevant engine dynamic data sheet "Forces and Moments" which is linked in the Marine Installation Manual (MIM). Stay pre-tensioning forces (max. piston hydraulic force) must also be considered and are provided by the stays supplier.

- The stay attachment point requirements must be crosschecked with the specification. The maximum forces transferred by the selected stays type must be within the range as defined on this drawing for standard engine execution. If the total force per stay exceeds the permissible range, reinforcement of the platform attachment points can be requested from the engine builder.
- The stays must adapt to the ship hull deformation and reduce the static reaction force acting on the engine and ship hull attachment points.
- The stays must increase the total stiffness of the system to avoid harmful resonance conditions. The dynamic stiffness of the stays (dynamic spring rate) is provided by the
- The stays must dampen accordingly to ensure that the acceptable vibrations (RMS limits) for the WinGD 2-stroke engine are met.
- The performance of the stays must be checked during sea trial by vibration measurements.
- Stay position in the vertical direction, respectively the distance to the bottom side of the upper platform beam must be arranged in a way that sufficient space for welding and application of the max. admissible stays inclination remains.
- The installation and commissioning of the stays must be in accordance with the supplier's instructions.

### Requirements on stays attachment points at ship hull side (per engine stay)

| Max. force acting on ship's hull  | Fh <sub>nax</sub>  | (kN)  | <del>*</del> 1) |
|-----------------------------------|--------------------|-------|-----------------|
| Minimum stiffness                 | k <sub>min.</sub>  | (N/m) | 0.5 x 10°       |
| Permissible deflection per 100 kN | Def <sub>max</sub> | (mm)  | 0.2             |

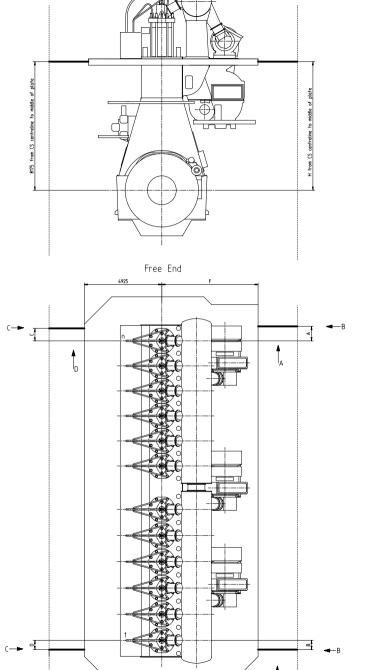
 $\star$ 1) Maximum engine force resulting from lateral moments of X/H type at the project specific rating plus stays pre-tensioning force according to stays supplier's specification



A0 lbam

PTAA030754 Pager's

| SEQ<br>NO         | QTY   | Item ID                 |                                     | Item Name   |                   |                                     | Dimension | Standard-I D      | Basic Material |               | \ | Net<br>Weight |
|-------------------|---|-------------------------|-------------------------------------|---|-------------------|-------------------------------------|-----------|-------------------|----------------|---------------|---|---------------|
| 001               | 1   | PTAA0                   | 30748                               | ENGINE  | STAYS             |                                     | BS, STD   |                   |                |               |   | (             |
|                   |   |                         |                                     |   |                   |                                     | ,         | l                 |                |               | 1 |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
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|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
|                   |   | 0.7.0.0.40              | 44.4.0 V00DE                        |   | 1                 |                                     |           |                   | T              |               |   |               |
| Prod.             |   | 0,7,0,9,10              | ,11,12 X92DF                        | -2.0  |                   |                                     |           |                   |                |               |   |               |
| ory               |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
| Change History    |   |                         |                                     |   |                   |                                     |           |                   |                |               |   |               |
| -                 | -   | sde101                  | yzh102                              |   |                   | new Document                        |           |                   | Arra ad        | A 11 11 0 1   | - | -             |
|                   |   | Creator                 | Approver                            | Approval Date   |                   | Change Synopsis                     |           |                   | Approved       | Activity Code | Е | С             |
|                   | WINGD   |                         |                                     |   | ENGI              | NE STAY                             | S         |                   |                |               |   |               |
|                   | Wi  | nterthu                 | r Gas &                             | Diesel  |                   |                                     |           |                   |                |               |   |               |
| Consti            | Bill Of Material pyright Winterthur Gas & Diesel Ltd. All rights reserved |                         |                                     |   | Dimension         |                                     |           |                   |                |               |   |               |
| Cobylid           | ınt <b>Wir</b><br>king p  | neπnur Gas<br>ossession | <b>a Diesei Ltd</b><br>of the docui | . An rights rese<br>ment the reci   | rved. Units       | [m] [kg] Basic Material             |           |                   |                | Net Weight    |   |               |
| By ta-<br>recogni | zes ai  | nd honours t            | hese rights. N                      | ment the reci<br>leither the whole  | e nor Main Design | Yes Design Group                    |           | 9715 Q-Code       | XXXXX          | Standard      | W | 0<br>/DS      |
| any pa            | art of  | this documer            | t mav be u                          | leither the whole<br>sed in any wa<br>ny other purpose<br>o third parties wi<br>ir Gas & Diesel | v for             | Yes Design Group  Engine A4 Item ID |           | 9715 Q-Code PTAAO | xxxxx<br>30759 |               |   |               |



Positions of stay attachment points on engine / platform side

 $\bigcirc$ 

(A)

(A)

| No. of<br>Cyl. | CrankshaftParts | Turbocharger<br>type | А   | В   | С   | D   | F    | Н    |
|----------------|-----------------|----------------------|-----|-----|-----|-----|------|------|
| 8              | 1               | 2 x MET83MB          | 855 | 855 | 795 | 795 | 6175 | 8175 |
| 8              | 2               | 2 x MET83MB          | 855 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 2 x MET71MB          | 855 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 2 x A280-L           | 855 | 892 | 795 | 832 | 6175 | 8175 |
| 9              | 2               | 2 x MET83MB          | 855 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 3 x MET66MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 3 x A275-L           | 795 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 3 x MET66MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |
| 10             | 2               | 3 x MET83MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |
|                | 2               | 3 x MET71MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |
| 11             | 2               | 3 x MET71MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |
| 12             | 2               | 3 x MET83MB          | 795 | 892 | 795 | 832 | 6175 | 8175 |

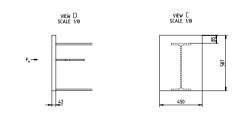
Layout of stays attachment points on platform exhaust side according to WinGD standard design

| SCALE 1:10 | SCALE 1:10 |
|------------|------------|
| f,         | 88         |
| 42         | 450        |

VIEW B

| Max. permissible force in lateral direction | F,   | (kN)  | ± 200     |
|---|------|-------|-----------|
| Stiffness                                   | k    | (N/m) | 0.6 x 10° |
| Permissible vertical stays displacement     | Def, | (mm)  | ± 50      |
| Permissible horizontal stays displacement   | Def, | (mm)  | ± 50      |
| Permissible angular stays displacement      | Def. | (°)   | 2         |

Layout of stays attachment points on platform fuel side according to WinGD standard design



| Max. permissible force in lateral direction | F,               | (kN)  | ± 200     |
|---|------------------|-------|-----------|
| Stiffness                                   | k                | (N/m) | 0.6 x 10° |
| Permissible vertical stays displacement     | Def,             | (mm)  | ± 50      |
| Permissible horizontal stays displacement   | Def,             | (mm)  | ± 50      |
| Permissible angular stays displacement      | Def <sub>a</sub> | (°)   | 2         |

Requirements for application of hydraulic stays on fuel side AND exhaust side

- The selected stays must have maker's acceptance for both side engine installation.
  WinGD approved supplier: Green & Clean Technology Co., Ltd (Korea)
  Hanni Hydraulic Machinery Co., Ltd (Korea)
  Nantong Navigation Machinery Group Co., Ltd (China)
- Installed on fuel side (FS) AND exhaust side (ES).

by the stays supplier.

- The amount of stays must be determined based on the requirement and stays suppliers specification. The transferred forces must be taken into consideration. The engine forces and moments are defined in the relevant engine dynamic data sheet "Forces and Moments" which is linked in the Marine Installation Manual (MIM). Stay pre-tensioning forces (max. piston hydraulic force) must also be considered and are provided
- The stay attachment point requirements must be crosschecked with the specification. The maximum forces transferred by the selected stays type must be within the range as defined on this drawing for standard engine execution. If the total force per stay exceeds the permissible range, reinforcement of the platform attachment points can be requested from the engine builder.
- The stays must adapt to the ship hull deformation and reduce the static reaction force acting on the engine and ship hull attachment points.
- The stays must increase the total stiffness of the system to avoid harmful resonance conditions. The dynamic stiffness of the stays (dynamic spring rate) is provided by the stays suppolier.
- The stays must dampen accordingly to ensure that the acceptable vibrations (RMS limits) for the WinGD 2-stroke engine are met.
- The performance of the stays must be checked during sea trial by vibration measurements.
- The installation and commissioning of the stays must be in accordance with the supplier's instructions.

Requirements on stays attachment points at ship hull side (per engine stay)

| Max. force acting on ship's hull  | Fh <sub>max</sub>  | (kN)  | <del>×</del> 1) |
|-----------------------------------|--------------------|-------|-----------------|
| Minimum stiffness                 | k <sub>min.</sub>  | (N/m) | 0.5 x 10°       |
| Permissible deflection per 100 kN | Def <sub>nax</sub> | (mm)  | 0.2             |

\*1) Maximum engine force resulting from lateral moments of X/H type at the project specific rating plus stays pre-tensioning force according to stays supplier's specification



# MIDS - WinGD X92DF-2.0 - Engine Stays (DG9715)

# TRACK CHANGES

| DATE       | SUBJECT                  | DESCRIPTION                 |
|------------|--------------------------|-----------------------------|
| 2022-06-08 | DRAWING SET              | First web upload            |
| 2022-12-23 | PTAA030754<br>PTAA030748 | System drgs. – new revision |

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