1 FOREWORD

This standard has been developed by the NORSOK standardisation work group and agreed by the Norwegian industry for the widest possible national and international application.

2 SCOPE

This Standard is a collection of the Material Data Sheets (MDS) applicable to selected material standards and grades for use in steel structures. The scope for the MDSes is as follows:

The materials shall be delivered in accordance with the standard referred to. In addition the MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

3 NORMATIVE REFERENCES

As stated in the individual data sheets.

4 DEFINITIONS

MDS Material data sheet
5 COLLECTION OF MATERIAL DATA SHEETS

5.1 General

The material selection menu for the actual strength levels and grades is shown in table 1.

All listed MDS' are enclosed.

The grades 235 and 275 (MDS Y01 and Y02) shall not be used for thicknesses above 25 mm.

5.2 Selection Criteria

The number of steel grades used in a project should be limited to the practical minimum (preferably one). An evaluation should be carried out to determined the optimum grade.

Table 1: Material Data Sheets for Structural Steel

<table>
<thead>
<tr>
<th>NORSOK Steel Grade</th>
<th>Standard</th>
<th>Product Type</th>
<th>Steel Quality Level</th>
<th>MDS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>S 235 JR G2</td>
<td>EN 10 025</td>
<td>Plates, Sections and Seamless tubulars</td>
<td>IV</td>
<td>Y01</td>
</tr>
<tr>
<td>S 275 JR</td>
<td>EN 10 025</td>
<td>Plates, Sections and Seamless tubulars</td>
<td>IV</td>
<td>Y02</td>
</tr>
<tr>
<td>S 355 J2 G3NO 1</td>
<td>EN 10 025prEN 10225</td>
<td>Plates, Sections and Seamless tubulars</td>
<td>III</td>
<td>Y03</td>
</tr>
<tr>
<td>S 355 NLO 5</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>I</td>
<td>Y20</td>
</tr>
<tr>
<td>S 355 NLO 5</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>I</td>
<td>Y21</td>
</tr>
<tr>
<td>S 355 NLO 5</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>I</td>
<td>Y22</td>
</tr>
<tr>
<td>S 355 NLO 3</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>II</td>
<td>Y25</td>
</tr>
<tr>
<td>S 355 NLO 3</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>II</td>
<td>Y26</td>
</tr>
<tr>
<td>S 355 NLO 3</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>II</td>
<td>Y27</td>
</tr>
<tr>
<td>Steel Grade</td>
<td>Standard</td>
<td>Product Type</td>
<td>Section</td>
<td>Year</td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td>-------------------</td>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>S 420 QLO 4</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>I</td>
<td>Y30</td>
</tr>
<tr>
<td>S 420 QLO 4</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>I</td>
<td>Y31</td>
</tr>
<tr>
<td>S 420 QLO 2 (mod)</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>I</td>
<td>Y32</td>
</tr>
<tr>
<td>S 420 QLO 2</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>II</td>
<td>Y35</td>
</tr>
<tr>
<td>S 420 QLO 2</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>II</td>
<td>Y36</td>
</tr>
<tr>
<td>S 420 QLO 2</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>II</td>
<td>Y37</td>
</tr>
<tr>
<td>S 460 QLO 4</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>I</td>
<td>Y40</td>
</tr>
<tr>
<td>S 460 QLO 4</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>I</td>
<td>Y41</td>
</tr>
<tr>
<td>S 460 QLO 2 (mod)</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>I</td>
<td>Y42</td>
</tr>
<tr>
<td>S 460 QLO 2</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>II</td>
<td>Y45</td>
</tr>
<tr>
<td>S 460 QLO 2</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>II</td>
<td>Y46</td>
</tr>
<tr>
<td>S 460 QLO 2</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>II</td>
<td>Y47</td>
</tr>
<tr>
<td>S 500 QLO 4 1)</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>I</td>
<td>Y50</td>
</tr>
<tr>
<td>S 500 QLO 4 1)</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>I</td>
<td>Y51</td>
</tr>
<tr>
<td>S 500 QLO 4 1)</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>I</td>
<td>Y52</td>
</tr>
<tr>
<td>S 500 QLO 2 1)</td>
<td>prEN 10225</td>
<td>Plates</td>
<td>II</td>
<td>Y55</td>
</tr>
<tr>
<td>S 500 QLO 2 1)</td>
<td>prEN 10225</td>
<td>Rolled Sections</td>
<td>II</td>
<td>Y56</td>
</tr>
<tr>
<td>S 500 QLO 2 1)</td>
<td>prEN 10225</td>
<td>Seamless Tubulars</td>
<td>II</td>
<td>Y57</td>
</tr>
</tbody>
</table>

Note 1): This steel grade designation is not included in prEN 10225.
### MATERIAL DATA SHEET MDS - Y01 Rev. 1

**TYPE OF MATERIAL:** Structural Steel, Grade 235

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates, sections and seamless tubulars</td>
<td>EN 10 025</td>
<td>S 235 JR G2</td>
</tr>
</tbody>
</table>

**SCOPE**

This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard. This grade shall not be used for thicknesses above 25mm.

**STEEL GRADE**

Grades S 235 J0, S 235 J2 G3, S 235 J2 G4 are acceptable as substitutes.

**QUALIFICATIONS**

**HEAT TREATMENT/Delivery CONDITION**

The steel shall comply with deoxidisation type “FN”, ref. option 3.

**CHEMICAL COMPOSITION**

**TENSILE TESTING**

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**

The surface of the material shall comply to Rustgrade A or B or better according to ISO 8501-1.

**MARKING**

**CERTIFICATION**

EN 10 204 Type 2.2.
### MATERIAL DATA SHEET MDS - Y02 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade 275

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates, sections and seamless tubulars</td>
<td>EN 10 025</td>
<td>S 275 JR</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard. This grade shall not be used for thicknesses above 25mm.

**STEEL GRADE**
Grades S 275 JO, S 275 J2 G3 and S 275 J2 G4 are acceptable as substitutes.

**QUALIFICATIONS**

**HEAT TREATMENT/DELIVERY CONDITION**

**CHEMICAL COMPOSITION**

**TENSILE TESTING**

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
The surface of the material shall comply to Rustgrade A or B or better according to ISO 8501-1.

**MARKING**

**CERTIFICATION**
EN 10 204 Type 2.2.
MATERIAL DATA SHEET MDS - Y03 Rev. 1

TYPE OF MATERIAL:
Structural Steel, Grade 355

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates and sections</td>
<td>EN 10 025</td>
<td>S 355 J2 G3</td>
</tr>
<tr>
<td>Seamless tubulars</td>
<td>prEN 10225</td>
<td>NO 1</td>
</tr>
</tbody>
</table>

SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

STEEL GRADE
For plates and sections, EN 10025 Grade S 355 K2 G3 is acceptable as substitute.

QUALIFICATIONS

HEAT TREATMENT/ DELIVERY CONDITION

CHEMICAL COMPOSITION

TENSILE TESTING

EXTENT OF TESTING

DIMENSIONS / TOLERANCES

NON DESTRUCTIVE EXAMINATION (NDE)

SURFACE PROTECTION
The surface of the material shall comply to Rustgrade A or B or better according to ISO 8501-1.

MARKING

CERTIFICATION
EN 10 204 Type 3.1.B.
**MATERIAL DATA SHEET MDS - Y20 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel with documented through thickness properties, Grade S 355 NLO 5

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 355 NLO 5</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- $25 < t < 40\text{mm}$
- $40 < t < 63\text{mm}$
- $63 < t < 100\text{mm}$
- $100 < t < 150\text{mm}$

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalized, TMCR (Option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the standard and any other elements intentionally added, and both CEV and Pcm values (option 6, 7, 8). The chemical composition shall be modified as follows: $N_{\text{max}} : 0.012\%, \ CEV_{\text{max}} : 0.41, \ Pcm_{\text{max}} 0.21\%$.

**TENSILE TESTING**
Through thickness testing shall be carried out for $t > 25 \text{mm}$ (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
## MATERIAL DATA SHEET MDS - Y21 Rev. 1

### TYPE OF MATERIAL:
Structural Steel with documented through thickness properties, grade S 355 NLO 5

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 355 NLO 5</td>
</tr>
</tbody>
</table>

### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for thicknesses above 25 mm (option 17).

### HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered, Normalized, TMCR (Option 5)

### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (Option 6, 7, 8). The chemical composition shall be modified as follows: Nmax : 0.012%, Pcm max 0.22%

### TENSILE TESTING
Through thickness testing shall be carried out in for \( t > 25 \) mm (option 12).

### DIMENSIONS / TOLERANCES

### NON DESTRUCTIVE EXAMINATION (NDE)
Ultrasonic examination of webs and flanges are required for web thicknesses above 12 mm (option para 7.7.2.3)

### SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

### MARKING
Unique marking as defined in the purchase order.

### CERTIFICATION
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y22 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel with documented through thickness properties, Grade S 355 NLO5

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars (Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 355 NLO5</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for tubular thicknesses above 25 mm (option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised (Option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition in Table 9 shall be modified as follows: Cmax: 0.16%, Nb+Vmax: 0.07, Pcm max 0.22%

**TENSILE TESTING**

**EXTENT OF TESTING**
Through thickness testing shall be carried out for t > 25 mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**
Ultrasonic examination to prEN 10246-14 (option 24).

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
<table>
<thead>
<tr>
<th>TYPE OF MATERIAL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Steel, Grade S 355 NLO 3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 355 NLO 3</td>
</tr>
</tbody>
</table>

| SCOPE | |
|-------| |
| This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard. |

| QUALIFICATIONS | |
|----------------| |
| Base material information and documentation and results of weldability tests shall be submitted with the bid / be established prior to delivery: The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order: 25 <t < 40 mm, 40 <t < 63 mm, 63 <t < 100 mm, 100 <t < 150 mm. Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser. |

| HEAT TREATMENT/DELIVERY CONDITION | Quenched and Tempered , Normalised, TMCR (Option 5). |

| CHEMICAL COMPOSITION | The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV value (option 6, 7, 8). The chemical composition shall be modified as follows: Nmax: 0.012%, CEVmax: 0.41, Pcm max 0.21%. |

| TENSILE TESTING | |

| EXTENT OF TESTING | |

| DIMENSIONS / TOLERANCES | |

| NON DESTRUCTIVE EXAMINATION (NDE) | |

| SURFACE PROTECTION | All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns. |

| MARKING | Unique marking as defined in the purchase order. |

| CERTIFICATION | EN 10 204 Type 3.1B |
**MATERIAL DATA SHEET MDS - Y26 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel, Grade S 355 NLO 3

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S355 NLO 3</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for thicknesses above 25 mm (option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised, TMCR (Option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition shall be modified as follows: Nmax : 0.012%, Pcm max 0.22%.

**TENSILE TESTING**

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
MATERIAL DATA SHEET MDS - Y27 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade S 355 NLO 3

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars (Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S355 NLO 3</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubular with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for tubular thicknesses above 25 mm (option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered , Normalised (Option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in table 9 and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition shall be modified as follows: Cmax : 0.16%, Pcm max 0.22%

**TENSILE TESTING**

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON Destructive Examination (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
MATERIAL DATA SHEET MDS - Y30 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, with documented through thickness properties, Grade S 420 QLO4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 420 QLO 4</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery:
The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- $25 < t < 40$ mm
- $40 < t < 63$ mm
- $63 < t < 80$ mm
- $80 < t < 100$ mm

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition.
Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. $0.25$ mm (as-welded)/min. $0.20$ mm (PWHT condition), unless a lower value has been accepted by the purchaser.

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered , Normalised, TMCR (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: $S_{\text{max}}$: 0.005%, $\text{Nb+V}_{\text{max}}$: 0.07%, CEV_{max}: 0.41, Pcm max 0.21%.

**TENSILE TESTING**
Mechanical properties given in Table 4b shall be modified as follows:
- Yield Strength (min.): 420 MPa (all thicknesses)
- Tensile Strength: 500-660 MPa (all thicknesses)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for $t > 25$ mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
## MATERIAL DATA SHEET MDS - Y31 Rev. 1

### TYPE OF MATERIAL:
Structural Steel with documented through thickness properties, Grade S 420 QLO4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 420 QLO4</td>
</tr>
</tbody>
</table>

### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest thickness of the delivery, within ± 5 mm. (Ref. option 17)

### HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered, Normalised, TMCR (option 5)

### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7 and 8). The chemical composition shall be modified as follows: Pcm max 0.22%

### TENSILE TESTING
Mechanical properties given in Table 6 shall be modified as follows:
- Yield Strength (min.): 420 MPa (all thicknesses)
- Tensile Strength: 500-660 MPa (all thicknesses)

### EXTENT OF TESTING
Through thickness testing shall be carried out for t >= 25 mm (option 12).

### DIMENSIONS / TOLERANCES

### NON DESTRUCTIVE EXAMINATION (NDE)
Ultrasonic examination of webs and flanges are required for web thicknesses above 12 mm (option para 7.7.2.3)

### SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

### MARKING
Unique marking as defined in the purchase order.

### CERTIFICATION
EN 10 204 Type 3.1B
**MATERIAL DATA SHEET MDS - Y32 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel with documented through thickness properties, Grade S 420 QLO2 (mod).

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars(Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 420 QLO2(mod).</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest tubular thickness of the delivery, within ± 5 mm (option 17).

**HEAT TREATMENT/DELIVERY CONDITION**
Quenched and Tempered, Normalised (option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition in Table 9 shall be modified as follows: Nb+Vmax: 0.07%, Pcm max 0.22%

**TENSILE TESTING**
Mechanical properties given in Table 10 shall be modified as follows:
Yield Strength (min.) : 420 MPa (all thicknesses)
Tensile Strength : 500-660 MPa (all thicknesses)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for t >= 25 mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
# MATERIAL DATA SHEET MDS - Y35 Rev. 1

## TYPE OF MATERIAL:
Structural Steel, Grade S 420 QL02

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 420 QL02</td>
</tr>
</tbody>
</table>

## SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

## QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- 25 < t < 40 mm
- 40 < t < 63 mm
- 63 < t < 80 mm
- 80 < t < 100 mm

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

## HEAT TREATMENT / DELIVERY CONDITION
Quenched and Tempered, Normalised, TMCR (Option 5)

## CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition shall be modified as follows: Nb+Vmax: 0.07 %, CEVmax: 0.41, Pcm max 0.21%.

## TENSILE TESTING
Mechanical properties given in Table 4b shall be modified as follows:
Yield Strength (min.): 420 MPa (all thicknesses)
Tensile Strength: 500-660 MPa (all thicknesses)

## EXTENT OF TESTING

## DIMENSIONS / TOLERANCES

## NON DESTRUCTIVE EXAMINATION (NDE)
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

## SURFACE PROTECTION

## MARKING
Unique marking as defined in the purchase order.

## CERTIFICATION
EN 10 204 Type 3.1B
## MATERIAL DATA SHEET MDS - Y36 Rev. 1

### TYPE OF MATERIAL:
Structural Steel, Grade S420 QLO2

<table>
<thead>
<tr>
<th>PRODUCr</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 420 QLO2</td>
</tr>
</tbody>
</table>

### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest thickness of the delivery, within ± 5 mm (ref. option 17).

### HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered, Normalised, TMCR (option 5)

### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7 and 8). The chemical composition shall be modified as follows: Nb+Vmax: 0.007%, Pcm max 0.22%

### TENSILE TESTING
Mechanical properties given in Table 6 shall be modified as follows:
Yield Strength (min.): 420 MPa (all thicknesses)
Tensile Strength: 500-660 MPa (all thicknesses)

### EXTENT OF TESTING

### DIMENSIONS / TOLERANCES

### NON DESTRUCTIVE EXAMINATION (NDE)

### SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

### MARKING
Unique marking as defined in the purchase order.

### CERTIFICATION
EN 10 204 Type 3.1B
**MATERIAL DATA SHEET MDS - Y37 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel, Grade S 420 QLO2

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars (Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 420 QLO2</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest tubular thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised (option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition in Table 9 shall be modified as follows: Pcm max 0.22%

**TENSILE TESTING**
Mechanical properties given in Table 10 shall be modified as follows:
Yield Strength (min.) : 420 MPa (all thicknesses)
Tensile Strength : 500-660 MPa (all thicknesses)

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
**MATERIAL DATA SHEET MDS - Y40 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel, with documented through thickness properties, Grade S 460 QLO4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 460 QLO 4</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- 25<\(t\) < 40 mm
- 40<\(t\) < 63 mm
- 63<\(t\) < 80 mm
- 80<\(t\) < 100 mm

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised, TMCR (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: Smax: 0.005%, Pmax: 0.015%, Pcm max 0.22%.

**TENSILE TESTING**
Mechanical properties shall be modified as follows:
- Yield Strength (min.) : 460 MPa (thicknesses < 40 mm)
- Yield Strength (min): 420 MPa (thicknesses > 40 mm)
- Tensile Strength : 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for \(t \geq 25\) mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
**TYPE OF MATERIAL:**
Structural Steel with documented through thickness properties, Grade S 460 QLO4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 460 QLO4</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/Delivery Condition**
Quenched and Tempered, Normalised, TMCR (option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7 and 8). The chemical composition shall be modified as follows: CEV max: 0.45, Pcm max 0.24%

**TENSILE TESTING**
Mechanical properties shall be modified as follows:
- Yield Strength (min.) : 460 MPa (thicknesses < 40 mm)
- Yield Strength (min): 420 MPa (thicknesses > 40 mm)
- Tensile Strength : 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for t >= 25 mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**
Ultrasonic examination of webs and flanges are required for web thicknesses above 12 mm (option para 7.7.2.3)

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
# MATERIAL DATA SHEET MDS - Y42 Rev. 1

## TYPE OF MATERIAL:
Structural Steel with documented through thickness properties, Grade S 460 QLO2 (mod).

<table>
<thead>
<tr>
<th>PRODUCT</th>
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</tr>
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<tbody>
<tr>
<td>Seamless tubulars(Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 460 QLO2(mod).</td>
</tr>
</tbody>
</table>

## SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

## QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest tubular thickness of the delivery, within ± 5 mm (ref. option 17).

## HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered (option 5).

## CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition in Table 9 shall be modified as follows: CEVmax: 0.45, Pcm max 0.24%

## TENSILE TESTING
Mechanical properties shall be modified as follows:
- Yield Strength (min.) : 460 MPa (thicknesses < 40 mm)
- Yield Strength (min): 420 MPa (thicknesses > 40 mm)
- Tensile Strength : 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660MPa (thicknesses > 40 mm)

## EXTENT OF TESTING
Through thickness testing shall be carried out for t >= 25 mm (option 12).

## DIMENSIONS / TOLERANCES

## NON DESTRUCTIVE EXAMINATION (NDE)

## SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

## MARKING
Unique marking as defined in the purchase order.

## CERTIFICATION
EN 10 204 Type 3.1B
## MATERIAL DATA SHEET MDS - Y45 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade S 460 QLO2

<table>
<thead>
<tr>
<th>PRODUCT</th>
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</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 460 QLO 2</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- 25<t < 40 mm
- 40<t < 63 mm
- 63<t < 80 mm
- 80<t < 100 mm

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised, TMCR (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: Pcm max 0.22%.

**TENSILE TESTING**
Mechanical properties shall be modified as follows:
- Yield Strength (min.): 460 MPa (thicknesses < 40 mm)
- Yield Strength (min.): 420 MPa (thicknesses > 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y46 Rev. 1

#### TYPE OF MATERIAL:
Structural Steel, S 460 QLO 2

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 460 QLO2</td>
</tr>
</tbody>
</table>

#### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

#### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest thickness of the delivery, within ± 5 mm (ref. option 17).

#### HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered, Normalised, TMCR (option 5)

#### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7 and 8). The chemical composition shall be modified as follows: CEV max: 0.45, Pcm max 0.24%

#### TENSILE TESTING
Mechanical properties shall be modified as follows:
- Yield Strength (min.) : 460 MPa (thicknesses < 40 mm)
- Yield Strength (min): 420 MPa (thicknesses > 40 mm)
- Tensile Strength : 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660MPa (thicknesses > 40 mm)

#### EXTENT OF TESTING

#### DIMENSIONS / TOLERANCES

#### NON DESTRUCTIVE EXAMINATION (NDE)

#### SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

#### MARKING
Unique marking as defined in the purchase order.

#### CERTIFICATION
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y47 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade S 460 QLO 2

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars (Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 460 QLO 2.</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest tubular thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/DELIVERY CONDITION**
Quenched and Tempered (option 5).

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values (option 6, 7, 8). The chemical composition in Table 9 shall be modified as follows: CEVmax: 0.45, Pcm max 0.24%.

**TENSILE TESTING**
Mechanical properties shall be modified as follows:
- Yield Strength (min.): 460 MPa (thicknesses < 40 mm)
- Yield Strength (min): 420 MPa (thicknesses > 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses < 40 mm)
- Tensile Strength: 500-660 MPa (thicknesses > 40 mm)

**NON DESTRUCTIVE EXAMINATION (NDE)**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
**MATERIAL DATA SHEET MDS - Y50 Rev. 1**

**TYPE OF MATERIAL:**
Structural Steel with documented through thickness properties, Grade S 500 QLO4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 500 QLO 4</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**STEEL GRADE**
Grade S 460 QLO 4 shall be modified to Grade S 500 QLO 4 as specified by this MDS.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order: 25 < t < 40 mm, 40 < t < 63 mm, 63 < t < 80 mm, 80 < t < 100 mm. Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered, Normalised, TMCR (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: Smax: 0.005%, Pmax: 0.015% Pcm max 0.22%.

**TENSILE TESTING**
Mechanical properties given in Table 4c for Grade S 460 QLO 4 shall be modified as follows: Yield Strength (min.): 500 MPa (thicknesses < 40 mm) Yield Strength (min): 460 MPa (thicknesses > 40 mm) Tensile Strength: 600-750 MPa (thicknesses < 40 mm) Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for t > 25 mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
### TYPE OF MATERIAL:
Structural Steel with documented through thickness properties, Grade S 500 QLO 4

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 500 QLO 4</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**STEEL GRADE**
Grade S 460 QLO 4 shall be modified to Grade S 500 QLO 4 as specified by this MDS.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: CEVmax: 0.45, Pcm max 0.24%.

**TENSILE TESTING**
Mechanical properties given in Table 6 for Grade S 460 QLO 4 shall be modified as follows:
- Yield Strength (min.): 500 MPa (thicknesses < 40 mm)
- Yield Strength (min): 460 MPa (thicknesses > 40 mm)
- Tensile Strength: 600-750 MPa (thicknesses < 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**
Through thickness testing shall be carried out for t >= 25 mm (option 12).

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**
Ultrasonic examination of webs and flanges are required for web thicknesses above 12 mm (option para 7.7.2.3).

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y52 Rev. 1

#### TYPE OF MATERIAL:
Structural Steel, with documented through thickness properties, Grade S 500 QLO4

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<thead>
<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
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</thead>
<tbody>
<tr>
<td>Seamless tubulars(Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 500 QLO 4</td>
</tr>
</tbody>
</table>

#### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

#### STEEL GRADE
Grade S 460 QLO 2 shall be modified to Grade S 500 QLO 4 as specified by this MDS.

#### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery: The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the largest tubular thickness of the delivery, within ± 5 mm (ref. option 17).

#### HEAT TREATMENT/ DELIVERY CONDITION
Quenched and Tempered (Option 5)

#### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: Smax: 0.007%, CEVmax: 0.45, Pcm max 0.24%.

#### TENSILE TESTING
Mechanical properties given in Table 10 for Grade S 460 QLO 2 shall be modified as follows:
- Yield Strength (min.) : 500 MPa (thicknesses < 40 mm)
- Yield Strength (min): 460 MPa (thicknesses > 40 mm)
- Tensile Strength : 600-750 MPa (thicknesses < 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

#### EXTENT OF TESTING
Through thickness testing shall be carried out for t > 25 mm (option 12).

#### DIMENSIONS / TOLERANCES

#### NON DESTRUCTIVE EXAMINATION (NDE)

#### SURFACE PROTECTION
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

#### MARKING
Unique marking as defined in the purchase order.

#### CERTIFICATION
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y55 Rev. 1

#### TYPE OF MATERIAL:
Structural Steel, Grade S 500 QLO 2

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<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
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</thead>
<tbody>
<tr>
<td>Plates</td>
<td>prEN 10225</td>
<td>S 500 QLO 2</td>
</tr>
</tbody>
</table>

#### SCOPE
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

#### STEEL GRADE
Grade S 460 QLO 2 shall be modified to Grade S 500 QLO 2 as specified by this MDS.

#### QUALIFICATIONS
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include strain ageing tests (ref. option 11), Charpy V-notch transition curves and typical tensile test results for plates within each of the following thickness ranges that are relevant for the order:
- 25<\(t\) < 40 mm
- 40<\(t\) < 63 mm
- 63<\(t\) < 80 mm
- 80<\(t\) < 100 mm

Documentation of base material and weldability tests shall cover both as-delivered and PWHT condition and the material shall comply with the specified requirements in PWHT condition. Weldability tests in accordance with Annex F shall be carried out within each of these thickness ranges (option 17). CTOD testing shall be included and shall meet a requirement of min. 0.25 mm (as-welded)/min. 0.20 mm (PWHT condition), unless a lower value has been accepted by the purchaser.

#### HEAT TREATMENT/Delivery CONDITION
Quenched and Tempered, Normalised, TMCR (Option 5)

#### CHEMICAL COMPOSITION
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: Pcm max 0.22%.

#### TENSILE TESTING
Mechanical properties given in Table 4c for Grade S 460 QLO 2 shall be modified as follows:
- Yield Strength (min.): 500 MPa (thicknesses < 40 mm)
- Yield Strength (min.): 460 MPa (thicknesses > 40 mm)
- Tensile Strength: 600-750 MPa (thicknesses < 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

#### EXTENT OF TESTING

#### DIMENSIONS/TOLERANCES

#### NON DESTRUCTIVE EXAMINATION (NDE)
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

#### MARKING
Unique marking as defined in the purchase order.

#### CERTIFICATION
EN 10 204 Type 3.1B
MATERIAL DATA SHEET MDS - Y56 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade S 500 QLO 2

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<th>PRODUCT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Rolled Sections</td>
<td>prEN 10225</td>
<td>S 500 QLO 2</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**STEEL GRADE**
Grade S 460 QLO 2 shall be modified to Grade S 500 QLO 2 as specified by this MDS.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for rolled sections with thickness approximately 20 mm or the greatest section thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the target thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/DELIVERY CONDITION**
Quenched and Tempered (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: CEVmax: 0.45, Pcm max 0.24%.

**TENSILE TESTING**
Mechanical properties given in Table 6 for Grade S 460 QLO 2 shall be modified as follows:
- Yield Strength (min.) : 500 MPa (thicknesses < 40 mm)
- Yield Strength (min): 460 MPa (thicknesses > 40 mm)
- Tensile Strength : 600-750 MPa (thicknesses < 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B
### MATERIAL DATA SHEET MDS - Y57 Rev. 1

**TYPE OF MATERIAL:**
Structural Steel, Grade S 500 QLO 2

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<tr>
<th>PRODUCT</th>
<th>STANDARD</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless tubulars (Seamless hollow sections)</td>
<td>prEN 10225</td>
<td>S 500 QLO 2</td>
</tr>
</tbody>
</table>

**SCOPE**
This MDS specifies the selected options in the referred standard and modified requirements which shall supersede the corresponding requirements in the referred standard.

**STEEL GRADE**
Grade S 460 QLO 2 shall be modified to Grade S 500 QLO 2 as specified by this MDS.

**QUALIFICATIONS**
Base material information and documentation and results of weldability tests shall be submitted with the bid/ be established prior to delivery. The documentation of base material shall include Charpy V-notch transition curves and typical tensile test results for tubulars with thickness approximately 20 mm or the greatest wall thickness required in the Purchase Order. Weldability tests in accordance with Annex F shall be carried out for the target tubular thickness of the delivery, within ± 5 mm (ref. option 17).

**HEAT TREATMENT/ DELIVERY CONDITION**
Quenched and Tempered (Option 5)

**CHEMICAL COMPOSITION**
The Manufacturer shall state the guaranteed minimum and maximum values for all elements listed in the Standard and any other elements intentionally added, and both Pcm and CEV values. (option 6, 7, 8). The chemical composition shall be modified as follows: CEVmax: 0.045, Pcm max 0.24%.

**TENSILE TESTING**
Mechanical properties given in Table 10 for Grade S 460 QLO 2 shall be modified as follows:
- Yield Strength (min.): 500 MPa (thicknesses < 40 mm)
- Yield Strength (min): 460 MPa (thicknesses > 40 mm)
- Tensile Strength: 600-750 MPa (thicknesses < 40 mm)
- Tensile Strength: 550-700 MPa (thicknesses > 40 mm)

**EXTENT OF TESTING**

**DIMENSIONS / TOLERANCES**

**NON DESTRUCTIVE EXAMINATION (NDE)**

**SURFACE PROTECTION**
All surfaces shall receive a preliminary protective primer coat. Blast cleaning shall comply with ISO 8501-1 Sa 2 1/2 and the surface shall remain at Sa 2 1/2 until application of the primer. The primer shall consist of 1 coat zinc ethyl silicate primer with 15 microns. Measured on a plane polished steel or glass test plate the maximum DFT shall be maximum 25 microns.

**MARKING**
Unique marking as defined in the purchase order.

**CERTIFICATION**
EN 10 204 Type 3.1B