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| <br>Software licensed to nc | Job No               | Sheet No<br><b>29</b> | Rev                         |
|  | Part                 |                       |                             |
|  | Ref                  |                       |                             |
|  | By Date13-Apr-22 Chd |                       |                             |
| Client   | File Engineering.std |                       | Date/Time 23-Jun-2022 21:54 |

**Steel Design (Track 2) Beam 28 Check 1**

| ALL UNITS ARE - KN  |                                 | METE (UNLESS OTHERWISE NOTED) |                | RATIO/ | LOADING/ |
|---|---------------------------------|-------------------------------|----------------|--------|----------|
| MEMBER  | TABLE                           | RESULT/                       | CRITICAL COND/ | MZ     | LOCATION |
|   |                                 | FX                            | MY             |        |          |
| =====   |                                 |                               |                |        |          |
| 28 ST   | 100X5SHS                        | (EUROPEAN SECTIONS)           |                |        |          |
|   |                                 | PASS                          | EC-6.3.3-662   | 0.392  | 3        |
|   | 24.67 C                         | -0.62                         | -2.86          | 0.00   |          |
| =====   |                                 |                               |                |        |          |
| MATERIAL DATA   |                                 |                               |                |        |          |
| Grade of steel  | = S 275                         |                               |                |        |          |
| Modulus of elasticity   | = 205 kN/mm2                    |                               |                |        |          |
| Design Strength (py)  | = 275 N/mm2                     |                               |                |        |          |
| SECTION PROPERTIES (units - cm)                                 |                                 |                               |                |        |          |
| Member Length =   | 340.00                          |                               |                |        |          |
| Gross Area =  | 18.70                           | Net Area =                    | 18.70          |        |          |
|   |                                 | z-axis                        | y-axis         |        |          |
| Moment of inertia   | :                               | 279.000                       | 279.000        |        |          |
| Plastic modulus   | :                               | 66.400                        | 66.400         |        |          |
| Elastic modulus   | :                               | 55.800                        | 55.800         |        |          |
| Shear Area  | :                               | 9.350                         | 9.350          |        |          |
| Radius of gyration  | :                               | 3.863                         | 3.863          |        |          |
| Effective Length  | :                               | 680.000                       | 680.000        |        |          |
| DESIGN DATA (units - kN,m)                                      |                                 |                               |                |        |          |
| Section Class   | :                               | EUROCODE NO.3 /2005 CLASS 1   |                |        |          |
| Squash Load   | :                               | 514.25                        |                |        |          |
| Axial force/Squash load   | :                               | 0.048                         |                |        |          |
| GM0 : 1.00  | GM1 : 1.00                      | GM2 : 1.25                    |                |        |          |
|   |                                 | z-axis                        | y-axis         |        |          |
| Slenderness ratio (KL/r)  | :                               | 176.0                         | 176.0          |        |          |
| Compression Capacity  | :                               | 111.7                         | 111.7          |        |          |
| Tension Capacity  | :                               | 514.3                         | 514.3          |        |          |
| Moment Capacity   | :                               | 18.3                          | 18.3           |        |          |
| Reduced Moment Capacity   | :                               | 18.3                          | 18.3           |        |          |
| Shear Capacity  | :                               | 148.5                         | 148.5          |        |          |
| BUCKLING CALCULATIONS (units - kN,m)                            |                                 |                               |                |        |          |
| Lateral Torsional Buckling Moment                               | MB = 18.3                       |                               |                |        |          |
| co-efficients C1 & K : C1 =1.132                                | K =1.0, Effective Length= 3.400 |                               |                |        |          |
| CRITICAL LOADS FOR EACH CLAUSE CHECK (units- kN,m):             |                                 |                               |                |        |          |
| CLAUSE  | RATIO                           | LOAD                          | FX             | VY     | VZ       |
| EC-6.3.1.1  | 0.221                           | 3                             | 24.7           | -0.8   | 0.2      |
| EC-6.2.9.1  | 0.157                           | 3                             | 24.7           | -0.8   | 0.2      |
| EC-6.3.3-661  | 0.346                           | 3                             | 24.7           | -0.8   | 0.2      |
| EC-6.3.3-662  | 0.392                           | 3                             | 24.7           | -0.8   | 0.2      |
| EC-6.2.6-(Z)  | 0.001                           | 3                             | 24.7           | -0.8   | 0.2      |
| EC-6.2.6-(Y)  | 0.006                           | 3                             | 24.7           | -0.8   | 0.2      |
| Torsion and deflections have not been considered in the design. |                                 |                               |                |        |          |

|  |                      |                       |                             |
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|  | Part                 |                       |                             |
|  | Ref                  |                       |                             |
|  | By Date13-Apr-22 Chd |                       |                             |
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**Steel Design (Track 2) Beam 29 Check 1**

| ALL UNITS ARE - KN  |              | METE (UNLESS OTHERWISE NOTED)   |                | RATIO/    |     | LOADING/ |      |
|---|--------------|---------------------------------|----------------|-----------|-----|----------|------|
| MEMBER  | TABLE        | RESULT/                         | CRITICAL COND/ | MZ        | MY  | LOCATION |      |
|   |              | FX                              | MY             |           |     |          |      |
| =====   |              |                                 |                |           |     |          |      |
| 29 ST   | 100X5SHS     | (EUROPEAN SECTIONS)             |                |           |     |          |      |
|   |              | PASS                            | EC-6.3.3-662   | 0.410     |     | 3        |      |
|   |              | 41.33 C                         | -0.68          | -0.23     |     | 0.00     |      |
| =====   |              |                                 |                |           |     |          |      |
| MATERIAL DATA   |              |                                 |                |           |     |          |      |
| Grade of steel  | = S 275      |                                 |                |           |     |          |      |
| Modulus of elasticity   | = 205 kN/mm2 |                                 |                |           |     |          |      |
| Design Strength (py)  | = 275 N/mm2  |                                 |                |           |     |          |      |
| SECTION PROPERTIES (units - cm)                                 |              |                                 |                |           |     |          |      |
| Member Length   | 340.00       |                                 |                |           |     |          |      |
| Gross Area  | = 18.70      | Net Area                        | = 18.70        |           |     |          |      |
|   |              | z-axis                          |                | y-axis    |     |          |      |
| Moment of inertia   | :            | 279.000                         |                | 279.000   |     |          |      |
| Plastic modulus   | :            | 66.400                          |                | 66.400    |     |          |      |
| Elastic modulus   | :            | 55.800                          |                | 55.800    |     |          |      |
| Shear Area  | :            | 9.350                           |                | 9.350     |     |          |      |
| Radius of gyration  | :            | 3.863                           |                | 3.863     |     |          |      |
| Effective Length  | :            | 680.000                         |                | 680.000   |     |          |      |
| DESIGN DATA (units - kN,m)                                      |              |                                 |                |           |     |          |      |
| Section Class   | :            | EUROCODE NO.3 /2005 CLASS 1     |                |           |     |          |      |
| Squash Load   | :            | 514.25                          |                |           |     |          |      |
| Axial force/Squash load   | :            | 0.080                           |                |           |     |          |      |
| GM0 : 1.00  | GM1 : 1.00   | GM2 : 1.25                      |                |           |     |          |      |
|   |              | z-axis                          |                | y-axis    |     |          |      |
| Slenderness ratio (KL/r)  | :            | 176.0                           |                | 176.0     |     |          |      |
| Compression Capacity  | :            | 111.7                           |                | 111.7     |     |          |      |
| Tension Capacity  | :            | 514.3                           |                | 514.3     |     |          |      |
| Moment Capacity   | :            | 18.3                            |                | 18.3      |     |          |      |
| Reduced Moment Capacity   | :            | 18.3                            |                | 18.3      |     |          |      |
| Shear Capacity  | :            | 148.5                           |                | 148.5     |     |          |      |
| BUCKLING CALCULATIONS (units - kN,m)                            |              |                                 |                |           |     |          |      |
| Lateral Torsional Buckling Moment                               |              |                                 |                | MB = 18.3 |     |          |      |
| co-efficients C1 & K : C1 =1.132                                |              | K =1.0, Effective Length= 3.400 |                |           |     |          |      |
| CRITICAL LOADS FOR EACH CLAUSE CHECK (units- kN,m):             |              |                                 |                |           |     |          |      |
| CLAUSE  | RATIO        | LOAD                            | FX             | VY        | VZ  | MY       |      |
| EC-6.3.1.1  | 0.370        | 3                               | 41.3           | -0.1      | 0.2 | -0.2     | -0.7 |
| EC-6.2.9.1  | 0.037        | 3                               | 41.3           | -0.1      | 0.2 | -0.2     | -0.7 |
| EC-6.3.3-661  | 0.397        | 3                               | 41.3           | -0.1      | 0.2 | -0.2     | -0.7 |
| EC-6.3.3-662  | 0.410        | 3                               | 41.3           | -0.1      | 0.2 | -0.2     | -0.7 |
| EC-6.2.6-(Z)  | 0.001        | 3                               | 41.3           | -0.1      | 0.2 | -0.2     | -0.7 |
| Torsion and deflections have not been considered in the design. |              |                                 |                |           |     |          |      |