



## EQUIVALENT GRADES

| Standard       | Grade / Designation     |
|----------------|-------------------------|
| ASTM (Bolting) | A1082 UNS S32205        |
| ASTM (Bolting) | A193 Gr. B8M (AISI 316) |
| ASTM (Nuts)    | A194 Gr. 8M (AISI 316)  |
| UNS            | S32205                  |
| EN             | 1.4462                  |
| WERKSTOFF NR.  | 1.4462                  |
| AFNOR          | Z3CN22-05               |
| AISI           | Duplex 2205             |
| ISO            | X2CrNiMoN22-5-3         |

## CHEMICAL COMPOSITION (Typical %)

| Element         | ASTM A1082 (UNS S32205) | ASTM A193 Gr. B8M (AISI 316) |
|-----------------|-------------------------|------------------------------|
| Carbon (C)      | ≤ 0.030                 | ≤ 0.08                       |
| Manganese (Mn)  | ≤ 2.00                  | ≤ 2.00                       |
| Silicon (Si)    | ≤ 1.00                  | ≤ 1.00                       |
| Phosphorus (P)  | ≤ 0.030                 | ≤ 0.045                      |
| Sulfur (S)      | ≤ 0.020                 | ≤ 0.030                      |
| Chromium (Cr)   | 21.0 – 23.0             | 16.0 – 18.0                  |
| Nickel (Ni)     | 4.5 – 6.5               | 10.0 – 14.0                  |
| Molybdenum (Mo) | 2.5 – 3.5               | 2.0 – 3.0                    |
| Nitrogen (N)    | 0.14 – 0.20             | ≤ 0.10                       |

## MECHANICAL PROPERTIES (Typical)

| Property                  | ASTM A1082 (UNS S32205) | ASTM A193 Gr. B8M (AISI 316) |
|---------------------------|-------------------------|------------------------------|
| Tensile Strength (MPa)    | ≥ 800                   | ≥ 515                        |
| Yield Strength 0.2% (MPa) | ≥ 550                   | ≥ 205                        |
| Elongation (%)            | ≥ 15                    | ≥ 40                         |
| Hardness (HB)             | ≤ 310                   | ≤ 217                        |

## CORROSION RESISTANCE

- Excellent resistance to chloride stress corrosion cracking (SCC)
- High resistance to pitting and crevice corrosion
- Performs well in marine, offshore and chemical environments
- Better corrosion resistance than standard austenitic stainless steels (e.g. 316/316L)
- Suitable for seawater, brine, desalination and process industry applications

## PREN (Pitting Resistance Equivalent Number)

| Grade                        | PREN (Typical) |
|------------------------------|----------------|
| UNS S32205 (Duplex 2205)     | ~ 35           |
| AISI 316 (ASTM A193 Gr. B8M) | ~ 24           |

## SOLUTION ANNEALING

|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
| Temperature | 1020 – 1100 °C (1870 – 2010 °F)                                                             |
| Process     | 1. Heat to 1020 – 1100 °C<br>2. Hold for sufficient time<br>3. Water quench (rapid cooling) |
| Purpose     | Restores corrosion resistance and optimum mechanical properties                             |

## APPLICABLE STANDARDS (Product Forms)

| Product    | Duplex 2205      | AISI 316 (B8M / 8M) |
|------------|------------------|---------------------|
| Studs      | ASTM A1082       | ASTM A193 Gr. B8M   |
| Hex Bolts  | ASTM A1082       | ASTM A193 Gr. B8M   |
| Nuts (Hex) | ASTM A194 Gr. 8M | ASTM A194 Gr. 8M    |
| Washers    | ASTM A240 / A276 | ASTM A240 / A276    |

## DIMENSIONS STANDARDS

| Product        | Metric (M)          | Inches (UNC/UNF) |
|----------------|---------------------|------------------|
| Hex Nuts       | ISO 4032            | ASME B18.2.2     |
| Heavy Hex Nuts | ISO 4034            | ASME B18.2.2     |
| Hex Bolts      | ISO 4017 / ISO 4014 | ASME B18.2.1     |
| Studs          | ISO 976 / ISO 898-1 | ASME B1.1        |
| Washers        | ISO 7089 / ISO 7090 | ASME B18.22.1    |

## TYPICAL APPLICATIONS



Oil &amp; Gas



Chemical Processing



Marine &amp; Offshore



Desalination



Power Generation



Pulp &amp; Paper



**RELIABLE  
FASTENERS  
FOR A STRONGER  
TOMORROW**