

INTRODUCTION

The demand for stainless steels has increased dramatically in recent years as more and more companies specify these materials for their products. Industries which utilize stainless steels extensively include chemical and power, food and beverage, aerospace, oil and gas, desalination, energy, pharmaceutical, and transportation. Other major uses are in architecture, domestic appliances, household utensils and small electrical and electronic appliances.

Stainless steels owe their widespread use to a combination of unique properties that have advantages over those of other steels and nonferrous metals for many applications. The principal outstanding characteristics are their resistance to corrosion in many environments, their good mechanical properties over an extremely wide range of temperatures, and their superior resistance to oxidation and scaling at very high temperatures.

These unique properties are achieved through substantial additions of chromium to iron and carbon, with or without the addition of other elements such as nickel, manganese, molybdenum, and nitrogen. Chromium, however, is the key ingredient since a dramatic increase in corrosion resistance occurs when a level of about 10.5% chromium is reached. Steels with at least 10.5% chromium have traditionally been designated as stainless steels.

These steels attain their stainless characteristics by virtue of their ability to form an invisible, adherent, chromium-rich oxide film which strongly resists attack by the atmosphere and many industrial gases and chemicals.

The chemical compositions of over 300 alloys are listed in this edition of manual, in addition to detailed information on 177 grades of steel which includes a general description of each alloy, its physical properties, its specified mechanical properties, and typical applications. Many of the recently developed duplex (austenitic-ferritic) and superaustenitic stainless steels are described as well as many modified versions of long-established grades.

This edition of the manual also includes a comprehensive stainless steel alloy index consisting of over 2200 names and numbers, complete lists of pertinent ASTM and AMS standards and specifications, an extensive guide to trade names and their origins, a cross index of national designations for similar stainless steels, and a list of typical applications.