CLAIMS

We claim:

1. An austenitic stainless steel comprising, in weight %, up to 0.20 C, 2.0-6.0 Mn, up to 2.0 Si, 16.0-23.0 Cr, 5.0-7.0 Ni, up to 3.0 Mo, up to 3.0 Cu, 0.1-0.35 N, up to 4.0 W, up to 0.01 B, up to 1.0 Co, iron and impurities, the steel having a ferrite number less than 11 and an MD_{30} value less than -10°C.

2. The austenitic stainless steel according to claim 1, wherein:

$$0.5 \leq (Mo + W/2) \leq 5.0$$

3. The austenitic stainless steel according to claim 1, wherein:

$$5.0 \leq (Ni + Co) \leq 8.0.$$

4. The austenitic stainless steel according to claim 1, having a PRE_W value greater than 26.

5. The austenitic stainless steel according to claim 1, having a ferrite number greater than 0 to less than 11.

6. The austenitic stainless steel according to claim 1, having a ferrite number of 3 up to 5.

7. The austenitic stainless steel according to claim 1, having a MD_{30} value less than -30° C.

8. The austenitic stainless steel according to claim 1, comprising up to 0.08 C.

9. The austenitic stainless steel according to claim 1, comprising up to 1.0 Si.

10. The austenitic stainless steel according to claim 1, comprising 3.0-6.0 Mn.

11. The austenitic stainless steel according to claim 1, comprising 17.0-23.0 Cr.

12. The austenitic stainless steel according to claim 1, comprising 0.14-0.35 N.

13. The austenitic stainless steel according to claim 1, comprising 0.5-3.0 Mo.

14. The austenitic stainless steel according to claim 1, comprising up to 0.008 B.

15. The austenitic stainless steel according to claim 1, comprising up to 1.0 Cu.

16. The austenitic stainless steel according to claim 1, comprising 0.5-3.0 Mo and wherein $5.0 \leq (Ni + Co) \leq 8.0$.

17. The austenitic stainless steel of claim 16, having a MD_{30} value less than -30°C.

18. The austenitic stainless steel according to claim 1, comprising 0.5-3.0 Mo and wherein $0.5 \leq (Mo + W/2) \leq 5.0$ and $5.0 \leq (Ni + Co) \leq 8.0$.

19. The austenitic stainless steel according to claim 1, comprising 0.5-3.0 Mo, and having a MD_{30} value less than -30° C.

20. The austenitic stainless steel according to claim 1, comprising, in weight %, up to 0.08 C, 3.0-6.0 Mn, up to 2.0 Si, 17.0-23.0 Cr, 5.0-7.0 Ni, 0.5-3.0 Mo, up to 1.0 Cu, 0.14-0.35 N, up to 4.0 W, up to 0.008 B, up to 1.0 Co, iron and impurities, the steel having a ferrite number less than 11 and an MD_{30} value less than -10°C.

21. The austenitic stainless steel according to claim 20, wherein:

$$5.0 \leq (Ni + Co) \leq 8.0.$$

22. The austenitic stainless steel of claim 1, consisting of up to 0.20 C, 2.0-6.0 Mn, up to 2.0 Si, 16.0-23.0 Cr, 5.0-7.0 Ni, up to 3.0 Mo, up to 3.0 Cu, 0.1-0.35 N, up to 4.0 W, up to 0.01 B, up to 1.0 Co, balance iron and impurities, the steel having a ferrite number less than 11 and an MD_{30} value less than -10°C.

23. The austenitic stainless steel according to claim 22, having a MD_{30} value less than -30° C.

24. The austenitic stainless steel according to claim 23, comprising 0.5-3.0 Mo.

25. The austenitic stainless steel according to claim 24, wherein:

$$5.0 \leq (Ni + Co) \leq 8.0.$$

26. An article of manufacture including an austenitic stainless steel comprising, in weight %, up to 0.20 C, 2.0-6.0 Mn, up to 2.0 Si, 16.0-23.0 Cr, 5.0-7.0 Ni, up to 3.0 Mo, up to 3.0 Cu, 0.1-0.35 N, up to 4.0 W, up to 0.01 B, up to 1.0 Co, iron and impurities, the steel having a ferrite number less than 11 and an MD_{30} value less than -10°C.

27. The article of manufacture of claim 26, wherein the austenitic stainless steel has a MD_{30} value less than -30°C.

28. The article of manufacture of claim 26, wherein the austenitic stainless steel comprises 0.5-3.0 Mo.

29. The article of manufacture of claim 26, wherein in the austenitic stainless steel $5.0 \leq (Ni + Co) \leq 8.0$.

30. The article of manufacture of claim 26, wherein the article is adapted for use in at least one of low temperature and cryogenic environments.

31. The article of manufacture of claim 26, wherein the article is selected from the group consisting of a corrosion resistant article, a corrosion resistant architectural panel, a flexible connector, a bellows, a tube, a pipe, a chimney liner, a flue liner, a plate frame heat exchanger part, a condenser part, a part for pharmaceutical processing equipment, a sanitary part, and a part for ethanol production or processing equipment.

CLAIMS

1. An austenitic stainless steel consisting of, in weight %,
up to 0.20 C,
2.0-6.0 Mn,
greater than 0.5 to less than 1.0 Si,
16.0-23.0 Cr,
5.0-7.0 Ni,
less than 1.5 Mo,
0.1-0.30 N,
up to 4.0 W,
0.0005-0.01 B,
up to 1.0 Co,
balance iron and
impurities,
the steel having a ferrite number between 5.6 and 11, an MD_{30} value less than −10° C., a PRE_W value greater than 26 up to 30, and wherein $0.5 \leq (Mo+W/2) \leq 3.5$.

2. The austenitic stainless steel according to claim **1**, having a MD_{30} value less than −30° C.

3. The austenitic stainless steel according to claim **1**, wherein C is limited to up to 0.08.

4. The austenitic stainless steel according to claim **1**, wherein Mn is limited to 3.0-6.0.

5. The austenitic stainless steel according to claim **1**, wherein Cr is limited to 17.0-23.0.

6. The austenitic stainless steel according to claim **1**, wherein N is limited to 0.14-0.30.

7. The austenitic stainless steel according to claim **1**, wherein Mo is limited to 0.5 to less than 1.5.

8. The austenitic stainless steel according to claim **1**, wherein B is limited to 0.0005-0.008.

9. The austenitic stainless steel according to claim **1**, wherein Mo is limited to 0.5 to less than 1.5, and wherein $5.0 \leq (Ni+Co) \leq 8.0$.

10. The austenitic stainless steel of claim **9**, having a MD_{30} value less than –30° C.

11. The austenitic stainless steel according to claim **1**, wherein Mo is 0.5 to less than 1.5, and having a MD_{30} value less than –30° C.

12. The austenitic stainless steel according to claim **1**, consisting of, in weight %,

up to 0.08 C,
3.0-6.0 Mn,
greater than 0.5 to less than 1.0 Si,
17.0-23.0 Cr,
5.0-7.0 Ni,
0.5 to less than 1.5 Mo,
0.14-0.30 N,
up to 4.0 W,
0.0005-0.008 B,
up to 1.0 Co,
balance iron and
impurities,

the steel having a ferrite number between 5.6 and 11, an MD_{30} value less than –10° C., a PRE_W value greater than 26 up to 30, and wherein $0.5 \leq (Mo+W/2) \leq 3.5$.

13. An article of manufacture including an austenitic stainless steel consisting of, in weight %,

up to 0.20 C,
2.0-6.0 Mn,
greater than 0.5 to less than 1.0 Si,
16.0-23.0 Cr,
5.0-7.0 Ni,
less than 1.5 Mo,
0.1-0.30 N,

up to 4.0 W,
0.0005-0.01 B,
up to 1.0 Co,
balance iron and
impurities,
the steel having a ferrite number between 5.6 and 11, an MD_{30} value less than −10° C., a PRE_W value greater than 26 up to 30, and wherein $0.5 \leq (Mo+W/2) \leq 3.5$.

14. The article of manufacture of claim **13**, wherein the austenitic stainless steel has a MD_{30} value less than −30° C.

15. The article of manufacture of claim **13**, including the austenitic stainless steel, wherein Mo is 0.5 to less than 1.5.

16. The article of manufacture of claim **13**, wherein the article is adapted for use in at least one of a low temperature environment and a cryogenic environment.

17. The article of manufacture of claim **13**, wherein the article is selected from the group consisting of a corrosion resistant article, a corrosion resistant architectural panel, a flexible connector, a bellows, a tube, a pipe, a chimney liner, a flue liner, a plate frame heat exchanger part, a condenser part, a part for pharmaceutical processing equipment, a sanitary part, a part for ethanol production equipment, and a part for ethanol processing equipment.

18. The austenitic stainless steel according to claim **1**, wherein Cr is limited to 16.0-19.8.

19. The austenitic stainless steel according to claim **1**, wherein Mo is limited to up to 1.0.

20. The article of manufacture of claim **13** including the austenitic stainless steel, wherein Cr is limited to 16.0-19.8.

21. The article of manufacture of claim **13** including the austenitic stainless steel, wherein Mo is limited to 0.5 to less than 1.5.

22. The article of manufacture of claim **13** including the austenitic stainless steel, wherein Mo is limited to up to 1.0.

23. The article of manufacture of claim **13** including an austenitic stainless steel consisting of, in weight %,

up to 0.08 C,
3.0-6.0 Mn,
greater than 0.5 to less than 1.0 Si,
17.0-23.0 Cr,
5.0-7.0 Ni,
less than 1.5 Mo,
0.14-0.30 N,
up to 4.0 W,
0.0005-0.008 B,
up to 1.0 Co,
balance iron and
impurities,
the steel having a ferrite number between 5.6 and 11, an MD_{30} value less than −10° C., a PRE_w value greater than 26 up to 30, and wherein $0.5 \leq (Mo+W/2) \leq 3.5$.

24. The austenitic stainless steel according to claim **1**, wherein Mn is limited to 3.5-6.0.

25. The article of manufacture of claim **13** including the austenitic stainless steel, wherein Mn is limited to 3.5-6.0.