

# Micron Alloy Castings Ltd

## TECHNICAL DATA - Special Alloys HEAT RESISTANT 22H

### Description

22H is a Nickel - Chromium - Tungsten alloy completely austenitic at all temperatures. Developed in U.S.A specifically for use within the temperature range 1050°C to 1250°C.

Field experience has proved 22H to have excellent stability with extremely good oxidation resistance even under cyclic conditions. Like all Ni alloys, 22H is unsuitable for use in reducing flue gases where hydrogen sulphide is present to any appreciable extent. In the presence of an excess of air, sulphur up to 100gr. per cu. ft does not appreciably attack the alloy.

Resistance to thermal fatigue is good, and whereas 22H is not recommended for quenching equipment, it is very satisfactory for other services involving thermal cycles and/or temperature gradients.

### Heat Treatment

Castings in 22H alloy are normally supplied in the as-cast condition.

### Applications

Roller Hearths, radiant tubes, retorts, furnace beam supports, muffles, burners, pier caps, hearth plates, etc.

### Design Considerations

Section thicknesses from 7mm up can be cast satisfactorily in 22H. Designs with drastic changes in section should be avoided and uniform thickness maintained whenever possible.

### Summary of Properties

#### Chemical Composition %

C	Mn	Si	P	S	W	Cr	Ni
0.40	2.0	1.75	0.05	0.05	4.0	25.0	45.0
to							
0.55	Max	Max	Max	Max	6.0	28.0	50.0

#### Mechanical Properties at room temperature

UTS	445 N/mm <sup>2</sup>
Elongation	3.5%
Reduction in Area	2.7%
Hardness	180 BHN

### Mechanical Properties at elevated temperatures

TEMP °C	UTS N/mm <sup>2</sup>	Elongation %
800	264	24.5
900	179	32.0
1000	110	32.5
1050	98	33.5
1100	67	40
1150	50	50
1200	36	50
1250	23	52.5

#### Limiting Creep Stress N/mm<sup>2</sup> (1% Ext. in 10000 hours)

1000°C	14	1150°C	3.86
1050°C	9.65	1200°C	2.2
1100°C	6.55	1250°C	1.17

#### Limiting Rupture Stress N/mm<sup>2</sup>

	1000 hr	10000 hr	100000 hr
1000°C	23.1	14.8	10
1050°C	16.55	10.34	6.55
1100°C	12	7.25	4.48
1150°C	8.96	5	2.75
1200°C	6.37	3.45	1.93
1250°C	4.65	2.48	1.31

### Physical Constants

Specific Gravity	8.05
Density Kg/cm <sup>3</sup>	0.0079
Melting Point	1380°C
Specific Heat (cals./gm./°C)	0.11
Electrical Resistivity, microhms/cm <sup>3</sup>	105
Magnetic Permeability	2.0μ

### Thermal Conductivity

	(cals/cm <sup>2</sup> /cm/sec/°C)
at 1000°C	0.07

### Mean Coefficient of Linear Expansion (cm/cm/°C x 10<sup>6</sup>)

20 - 700°C	38.3
20 - 800°C	39.1
20 - 900°C	39.8
20 - 1000°C	40.6
20 - 1100°C	41.4
20 - 1200°C	42

### Oxidizing Rates in Air (mm per year)

975°C	0.216
1100°C	0.762
1200°C	1.143
1250°C	1.397

### Maximum Operating Temperatures

Oxidising	1230°C
Reducing	1190°C

*Properties listed are typical of published laboratory tests and are intended as a guide only. This data should not be considered as guaranteed maximums or minimums. Materials should be tested under actual service conditions to determine their suitability for particular applications.*