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**ALLOY DATA SHEET** **HEAT RESISTANT ALLOY**

# KHR16C

**REVISION** : 05/99

## DESCRIPTION

KHR16C is an austenitic Fe-Cr-Ni-Nb alloy developed from KHR12C (24Cr-14Ni-Nb). Niobium is added to increase high temperature creep rupture strength and aged ductility. The alloy is specifically designed for components that are subjected to frequent thermal cycling and shock. The high temperature strength of KHR16C is greater than HP-Nb alloy.

## COMPOSITION

| | C | Cr | Ni | Add |
|---|---|---|---|---|
| Min % | 0.20 | 20 | 15 | |
| Max % | 0.40 | 30 | 25 | Nb, others |

## APPLICATIONS

Coiler Drums, Muffles and Rolls, Trays, Tube Supports and Hangers, Cyclone for PFBC.

## PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

## PHYSICAL PROPERTIES

| | | |
|---|---|---|
| Density (lbs/in$^3$) | 0.2828 | |
| Thermal Expansion | 10.2 | @ 68 - 1472 $^oF$ |
| ( x $10^{-6}$ in/in $^oF$) | 10.6 | @ 68 - 1832 $^oF$ |
| | 10.9 | @ 68 - 2012 $^oF$ |
| Thermal Conductivity | 7.5 | @ 68$^oF$ |
| (Btu/(h*ft*$^oF$) | 15.5 | @ 1652$^oF$ |
| | 16.2 | @ 2012$^oF$ |

## MECHANICAL PROPERTIES

(Tensile properties at Elevated Temperature for Static Castings with Heavy Wall Thickness (90 mm) / Typical Values)

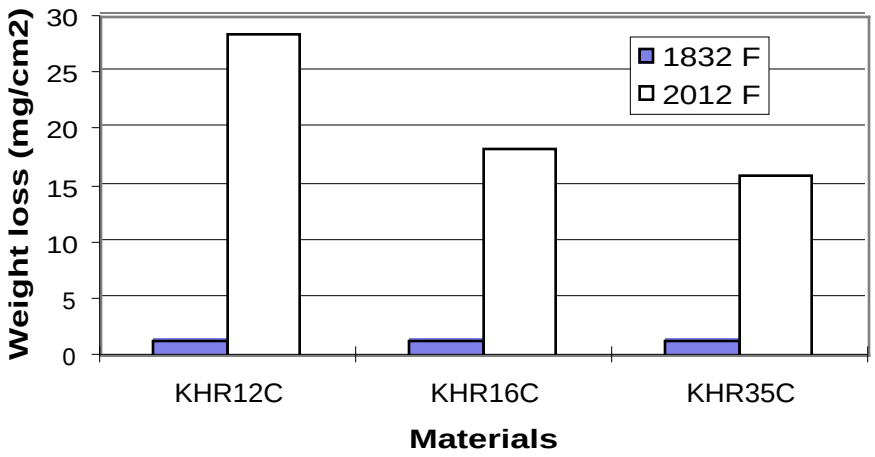
| | | | KHR12C | **KHR16C** | HP-Nb |
|---|---|---|---|---|---|
| 1652$^oF$ | U.T.S. | ksi | 15.8 | **22.3** | 20.2 |
| | Y.S. | ksi | 8.3 | **13.8** | 10.7 |
| | El. | % | 35 | **25** | 29 |

| | | | KHR12C | **KHR16C** | HP-Nb |
|---|---|---|---|---|---|
| 1832$^oF$ | U.T.S. | ksi | 9.4 | **13.5** | 13.5 |
| | Y.S. | ksi | 5.4 | **8.4** | 7.4 |
| | El. | % | 34 | **29** | 33 |

## SERVICE TEMPERATURE

KHR16C can be used at temperatures up to 1922$^oF$

## OXIDATION RESISTANCE




## WELDABILITY

The alloy may be welded by the SMAW, GTAW and GMAW processes. Welding procedures are available from Kubota Metal Corporation.

## CREEP-RUPTURE PROPERTIES

Long term creep-rupture properties were extrapolated from Larson-Miller Parameter versus stress plots.

**RUPTURE-STRESS-KSI**

| HOURS | | 1500 | 1600 | 1700 | 1800 |
|---|---|---|---|---|---|
| 1,000 | AVG. | 8.83 | 6.20 | 4.27 | 2.98 |
| | MIN. | 7.49 | 5.23 | 3.65 | 2.55 |
| 10,000 | AVG. | 6.28 | 4.31 | 2.90 | 2.01 |
| | MIN. | 5.36 | 3.68 | 2.52 | 1.73 |
| 100,000 | AVG. | 4.49 | 3.01 | 2.02 | 1.36 |
| | MIN. | 3.83 | 2.58 | 1.74 | 1.17 |

Note: Creep-rupture stresses are subject to periodic revisions as the results from long term tests become available.

## THERMAL SHOCK RESISTANCE

Resistance to thermal shock of KHR16C is better than that of HK40 and HP-Nb high carbon material

## RELATED SPECIFICATIONS

None

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