



50 YEARS OF PERFORMANCE DESIGNED SOLUTIONS

UNI-2TUFF RF-70

**FIELD
UPDATE**

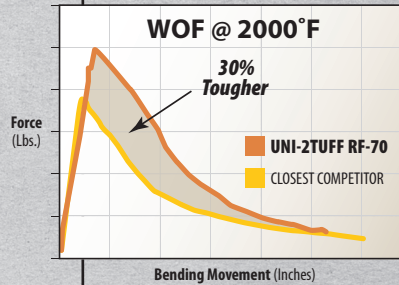
Product Features:

UNI-2TUFF RF-70 is an advanced high steel fiber castable designed to resist mechanical abuse and thermal shock.

- Superior Oxid. Resistance to 2400°F
- Proprietary Fiber Shape/Aspect Ratio
- Mix Chassis Maximizes Fiber Knitting
- Superior Resistance to Crack Propagation and Mechanical Abuse

Unique Testing:

Special testing is required to accurately measure the benefits of **UNI-2TUFF RF-70**.



Work of Fracture (WOF) analysis conducted at 2000°F quantifies the amount of work required to fracture, propagate and separate a sample

Scan for more information on UNI-2TUFF



Comparison Data:

Compared to its closest competition, **UNI-2TUFF RF-70*** also shows superior properties in standard ASTM tests.

*Also available in Aluminum resistant formulation.

CRITICAL WEAR MECHANISMS	CLOSEST COMPETITION	UNI-2TUFF RF-70
Installation Method	Vibcast	Vibcast
Hot MOR at 1500°F	2462 psi	3702 psi
Hot MOR at 2000°F	2094 psi	3255 psi
C-704 Abrasion Loss After 1500°F	6.0cc loss (TDS)/4.0cc loss	3.1cc loss
C-704 Abrasion Loss After 2000°F	3.5cc loss (TDS)/3.7cc loss	3.3cc loss
Din 51068 Water Quench Prism Spall Cycles to Failure:		
2000°F Water Quench	>30 cycles	>30 cycles
2200°F Water Quench	19 cycles	>30 cycles

Field Results:

North-East Major Secondary Aluminum Producer

- **UNI-2TUFF RF-70** cast in a melting furnace lintel in comparison to closest competitor

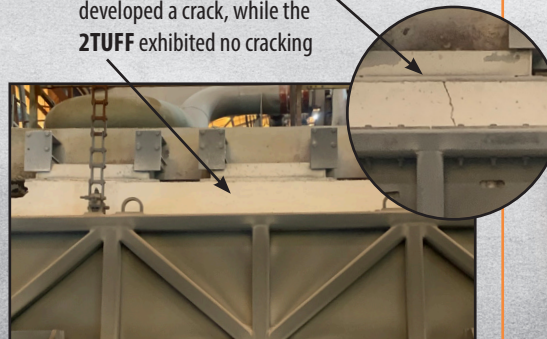
"The 2TUFF is outperforming your competition, and we're looking for other opportunities to use it"

Cast House Engineer

50 YEARS
URC4U
SERVICE

Southern Major Secondary Aluminum Producer

- **UNI-2TUFF RF-70** cast side-by-side with closest competitor in holder lintel
- After 3 months, the competition's lintel developed a crack, while the **2TUFF** exhibited no cracking



Eastern Major Secondary Aluminum Producer

- **UNI-2TUFF RF-70** was cast in a sill, with a goal of 6 months life (*typical service*)
- After 10 months the **2TUFF** is intact and in service





OVER 45 YEARS OF PERFORMANCE DESIGNED SOLUTIONS

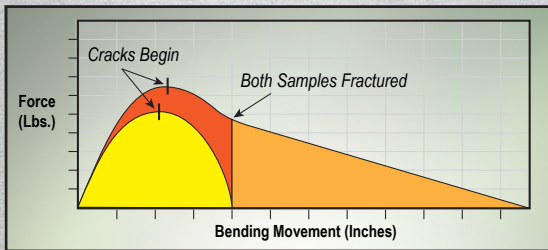
UNI-TUFF RF SERIES

High Steel Fiber Castables

Need: Maximum Resistance to Mechanical Abuse and Cracking due to Thermal Cycling

Measurement: **Traditional Methods**..... Tests such as CCS and MOR **do not** accurately measure resistance to mechanical abuse, cracking or extreme thermal shock

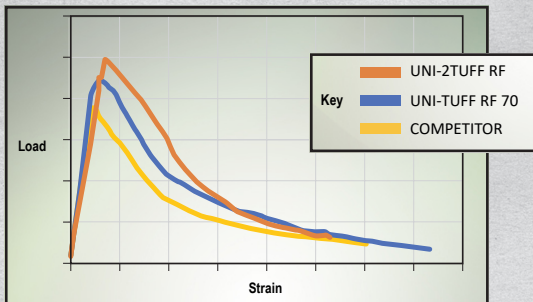
Work of Fracture (WOF)..... A 3-point load test conducted at 2000°F that quantifies the **amount of work** to fracture, propagate and separate a sample... especially effective with steel fiber reinforced monoliths



Standard vs Fiber Reinforced

Standard Sample		Work or Energy Required to Crack, Fracture and Separate (<i>Work of Fracture</i>)
Fiber Sample		Additional Work Necessary to Crack and Fracture Fiber Reinforced Sample (<i>Extra Crack Resistance</i>)
Fiber Sample		Additional Work Necessary to Separate Fiber Reinforced Sample (<i>Extra Holding Power</i>)

Results: WOF @ 2000°F



UNI-TUFF RF-70

High Steel Fiber Castables with RF (Rapid Fire) Technology

- Required Oxid. Resistance to 2200°F
- Mix Chassis Maximizes Fiber Knitting
- Excellent Resistance to Crack Propagation and Mechanical Abuse

UNI-2TUFF RF-70

- Superior Oxid. Resistance to 2400°F
- Proprietary Fiber Shape/Aspect Ratio
- Mix Chassis Maximizes Fiber Knitting
- Superior Resistance to Crack Propagation and Mechanical Abuse

UNI-TUFF RF Series Requires More Work at Temp. to Crack, Propagate and Separate.

Properties:

TEST	UNI-TUFF RF-70	UNI-2TUFF RF-70	Competitor
HMOR @ 1500°F (psi)	3650	3700	2462
C704 @ 1500°F (cc)	4.3	3.1	6.0
Prism spall shock test (cycles)	26	>30	19
Continuous Exposure (MAX temp°F)	2200	2400	2200

Summary: **Crack Resistance:**..... In HOT WOF testing, UNI-TUFF RF-70 and UNI-2TUFF RF-70 **outperform** the leading competition by **20% and 30%** respectively in fracture toughness.

Improved Matrix Technology:.... The UNI-TUFF RF Series utilizes **proprietary matrix technology** to uniformly disperse the SS fiber addition.

New SS Fiber Addition:..... UNI-2TUFF RF-70 is fortified with a **unique SS fiber alloy** possessing an optimum aspect ratio and increased oxidation protection by 200°F.

Precast Solutions:..... Critical Aluminum super-structure applications, i.e. Jamb/Lintels, Door Surrounds and Heat Treat/Forge Furnaces that experience **mechanical abuse and thermal shock.**