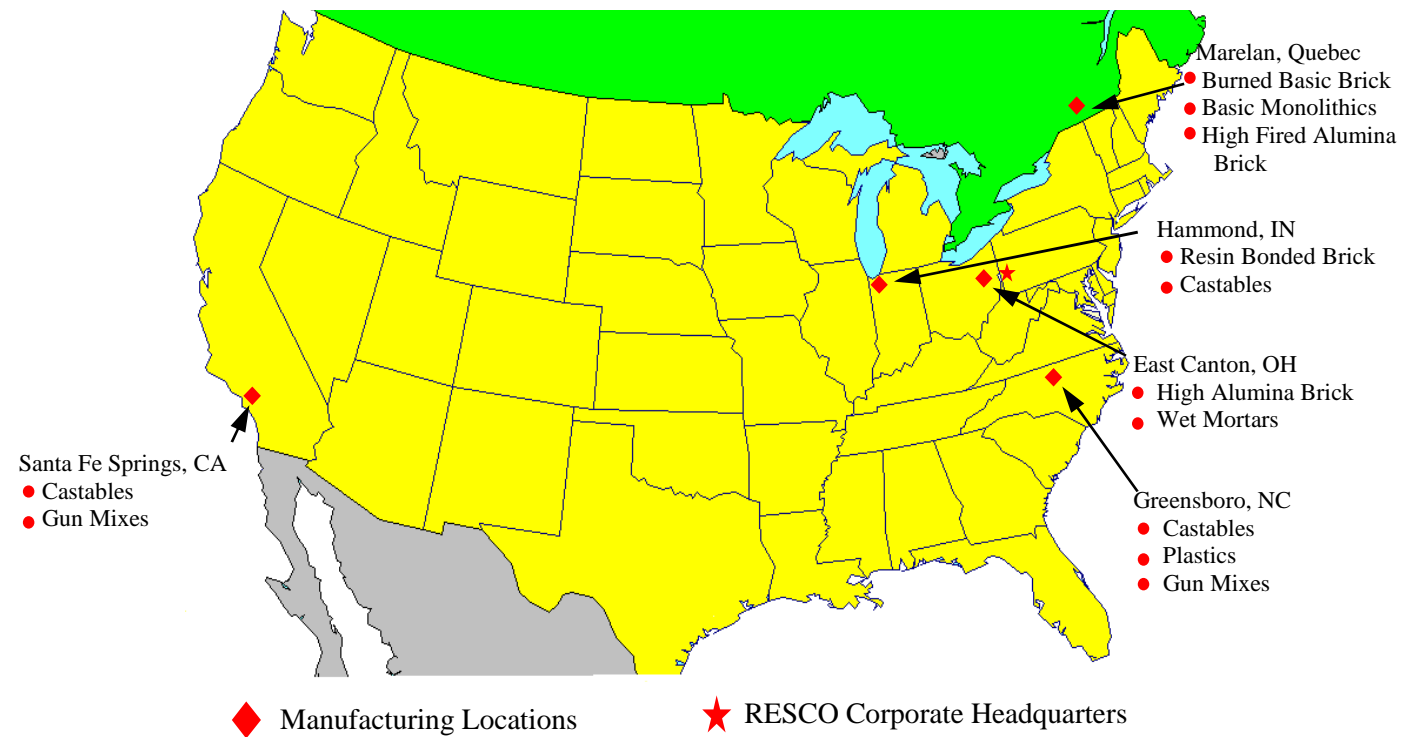


Resco Manufacturing Locations



Regional Sales Offices

Pittsburgh, PA Phone: 888.283.5505 Fax: 412.494.4571	Nacogdoches, TX Phone: 936.560.3335 Fax: 936.560.6351	Canada Customer Service Phone: 450.691.2933 Fax: 450.691.2966	Resco Canada Phone: 819.242.2721 Fax: 819.242.9718
Norristown, PA Phone: 610.292.3500 Fax: 610.279.6070	Gary, IN Phone: 219.886.9767 Fax: 219.886.9821	Greensboro (Cartop/Minerals) Phone: 336.299.1441 Fax: 336.855.8375	Santa Fe Springs, CA Phone: 562.802.2463 Fax: 562.802.0315

RESCO for the Long Run

Founded in 1946, Resco has served its markets with specialized products ever since, initially, with the refining industry and later in the steel industry. Innovations have been key to Resco's long success, including AA-22 and the original patent on semi-universal ladle brick.

Recent acquisitions have diversified Resco into many new refractory markets. The addition of National's product lines allows Resco to offer a comprehensive range of products.



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 Penn Center West
 Building 2, Suite 430
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K/R-638

K/R-838

K/R-1138

K/R-1278

K/R-1738

K/R-2178



MONOLITHIC ANCHORING SYSTEMS GUIDE

AN AMERICAN-OWNED
 REFRACTORY COMPANY





GUIDELINES for MONOLITHIC ANCHORING SYSTEMS

Resco Products, Inc. offers a complete line of anchors to secure monolithic installations. Metal anchors are typically used below 2000°F. Above 2000°F ceramic anchors are **recommended**. A heat flow analysis should be conducted for the application construction to determine the operating temperatures expected for the anchor system. The metal and ceramic anchors that are available are highlighted here.

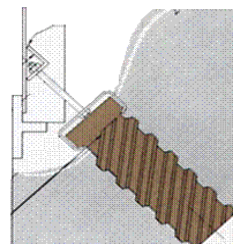
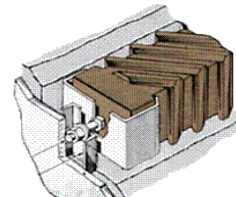
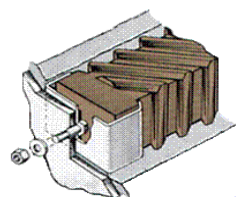
CERAMIC ANCHORS

The main refractory anchor shape is prefaced with K/R and then the length of the anchor shape. For walls and C-Clips the gap of 5/8" between the back of the anchor and the supporting steel is designed to be standard length refractory linings, such as 9", 12", 13 1/2", and 18", for side walls. For roofs the standard gap between the bottom of the I-Beam and top of the refractory anchor is either 7/8" or 1 1/8" depending on the use of Ice Tongs or a traditional D9703 hanger attachment. If the lining is needed to fit a specific thickness, not matching these standards, the brick shape can always be cut to suit, or some special metal attachments can be formed.

The following shapes will be standard:

<u>Shape</u>	<u>Length</u>	<u>Part #</u>
K/R-638	6 3/8"	91764
K/R-838	8 3/8"	89718
K/R-1138	11 3/8"	89863
K/R-1278	12 7/8"	89719
K/R-1738	17 3/8"	89844

Ceramic anchors are typically used in plastic monolithic construction for applications that exceed 2000°F. They are sometimes used for other castable construction as well. The anchors are placed in walls, roofs, arches and noses to provide support for the refractory mass.



Technical Data

ALUMEX® P-85 HS HIGH ALUMINA, HIGH STRENGTH BRICK

PHYSICAL PROPERTIES (ASTM procedures used where applicable)		
Bulk Density: (lb/ft ³)		175
Modulus of Rupture: (lb/in ²)		2,300
Cold Crushing Strength: (lb/in ²)		10,000
Apparent Porosity, %:		13.8
Permanent Linear Change, %: 2910°F (1600°C) & 5 Hours		+0.4
CHEMICAL ANALYSIS (Ignited)		
	Al ₂ O ₃	79.2
	SiO ₂	10.2
	Fe ₂ O ₃	1.7
	TiO ₂	3.1
	CaO	0.3
	MgO	0.2
	P ₂ O ₅	4.9
	Alkalies	0.4

This data represents average properties obtained from commercial production lots and should not be considered guaranteed specifications. RESCO disclaims any express or implied warranties based on this sheet.

5/25/2004 is the date this data sheet was published. Check with your RESCO Refractories sales office to make sure you have a current data sheet, since this technical data may have changed.

Cast Metal Anchor Spacing

	Lining Thickness	Anchor Centers
Vertical and Circular Construction	9"-12"	12"
	12"-15"	18"
	>15"	18"
Roofs, Noses & Arches	6"+	12"

Anchor Quantities – All Types

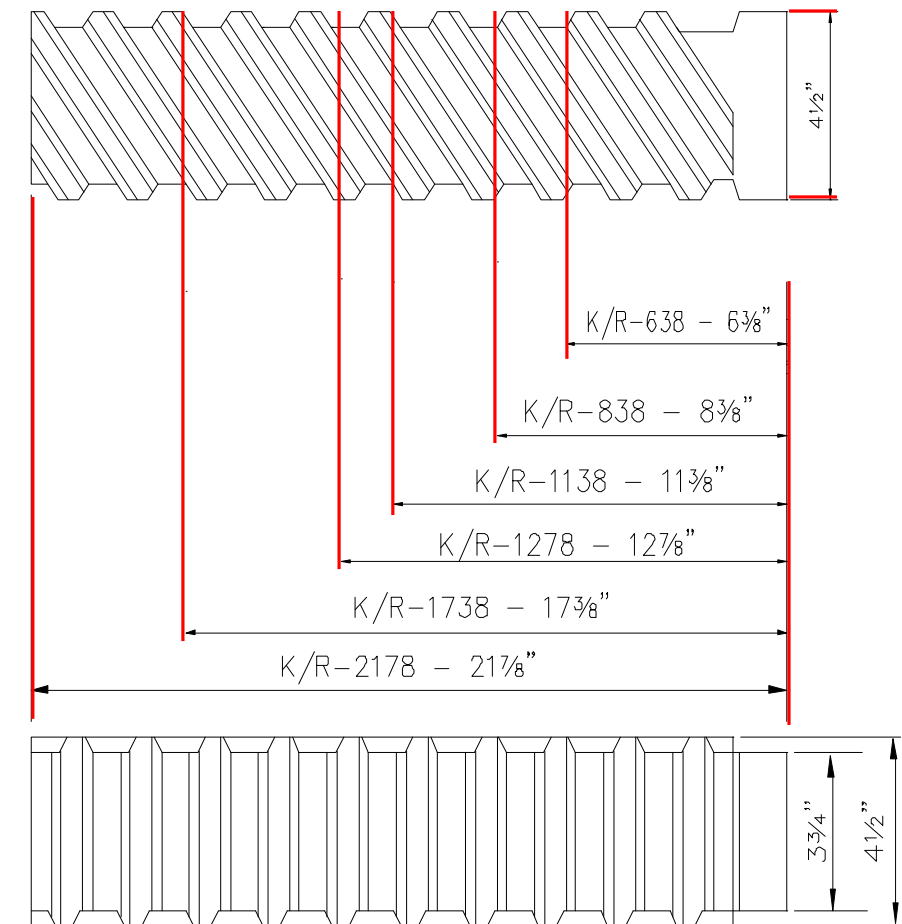
Anchor quantities are determined by multiplying the anchors required per square foot times the total number of square feet. Additional overage amounts are added onto this depending on the size of the result.

The anchors required per square foot is determined from the following table or by: $144 \div (A \times B)$

Anchor Centers A x B	Anchors/Ft ²
6" x 6"	4
8" x 8"	2.25
9" x 9"	1.78
9" x 12"	1.33
10" x 10"	1.44
12" x 12"	1
12" x 18"	0.67

Suggested Use Limits of Fabricated and Cast Metal Anchors:

METAL	SERVICE LIMIT - °F
Carbon Steel	1100
Mild Steel	800
Cast Iron	1000
Ductile Iron	1050
304 SS	1800
309 SS	2000
310 SS	2000
330 SS	2000
Inconel 601	2200

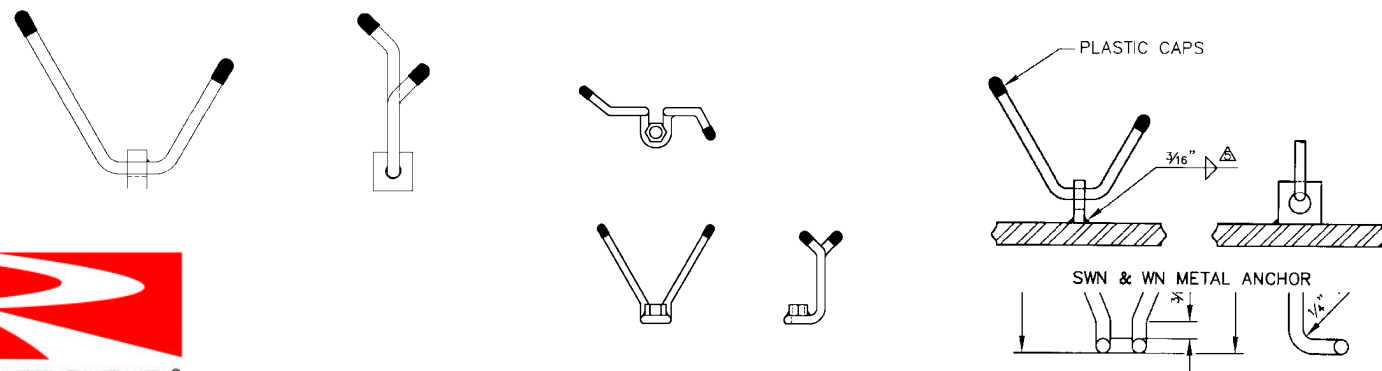


ALUMEX P-85 HS CERAMIC ANCHORS

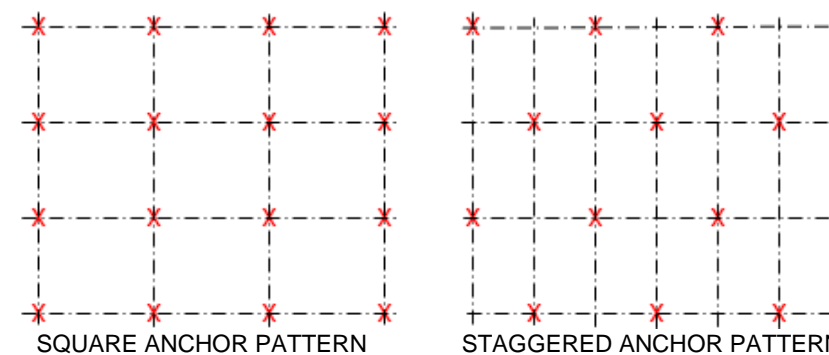
ANCHOR	LENGTH	VOLUME - in ³	WEIGHT PER	STANDARD LINING	PCS PER PALLET	PART #
K/R-638	6 3/8"	104.29	10.51	7"	342	91764
K/R-838	8 3/8"	136.69	13.77	9"	280	89718
K/R-1138	11 3/8"	189.34	19.07	12"	224	89863
K/R-1278	12 7/8"	213.64	21.52	13 1/2"	182	89719
K/R-1738	17 3/8"	290.59	29.27	18"	142	89844
K/R-2178	21 7/8"	367.54	37.03	22 1/2"	114	91765

COAT METALLIC ANCHOR TIPS TO MINIMIZE EXPANSION CRACKS.

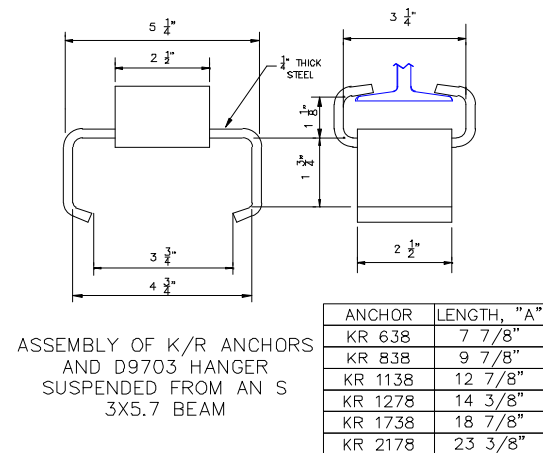
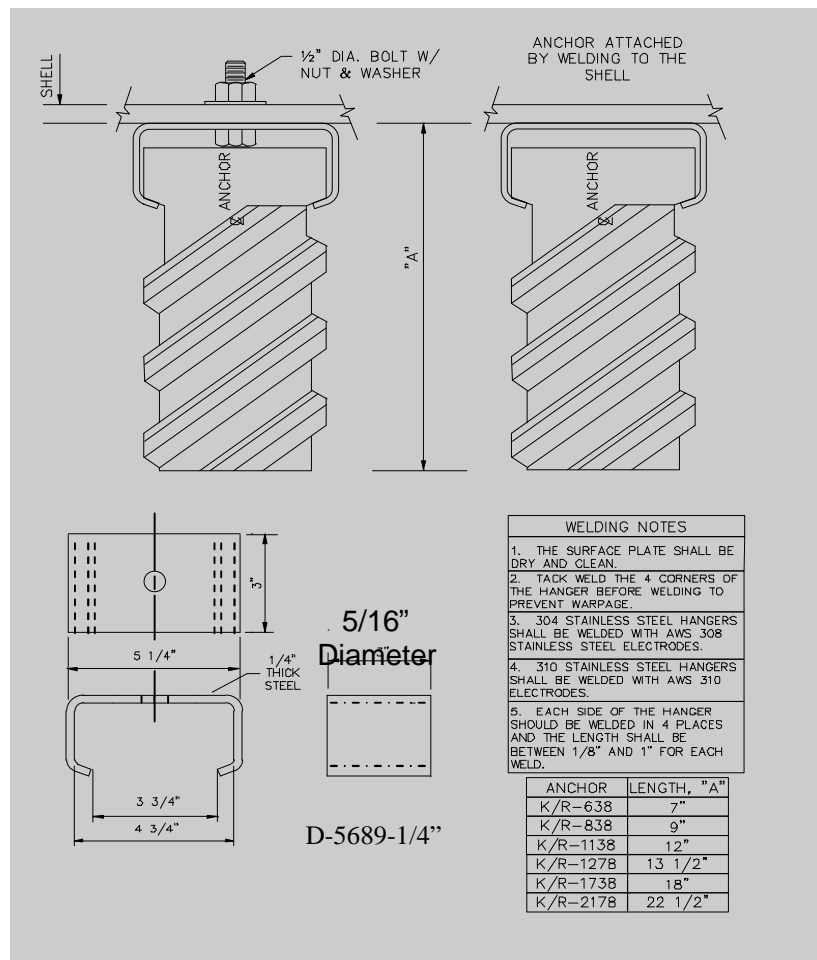
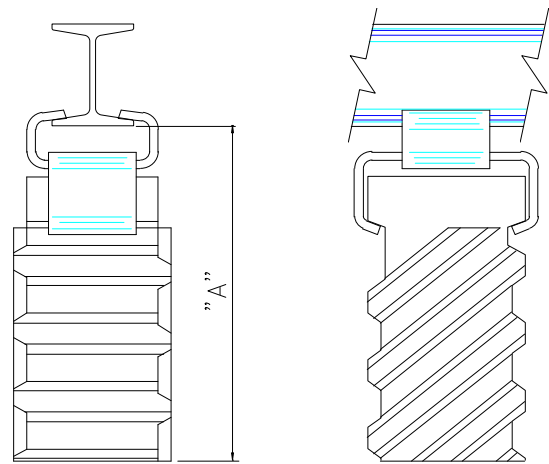
The use limit will also depend on the application conditions and environment. Not all metal anchors are available in the listed materials.



ANCHOR PATTERNS



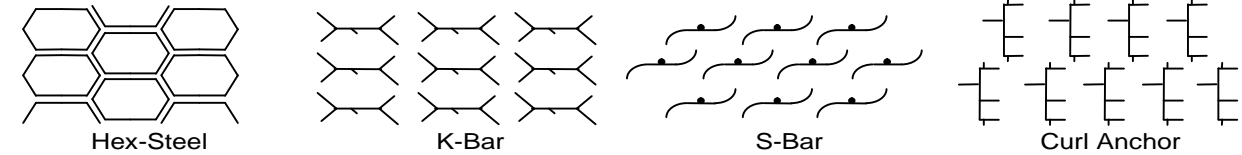
Ceramic Anchor Spacing	Lining Thickness	Anchor Centers
Vertical and Circular Construction	9"-12"	12"
	12"-15"	18"
	>15"	18"
Roofs, Noses & Arches	>6"	12"



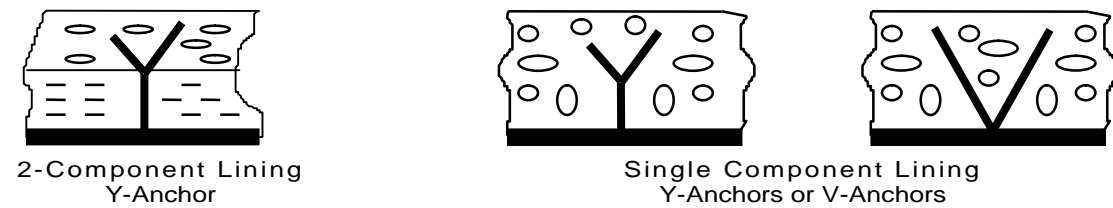
FABRICATED, WIRE AND CAST METAL ANCHORS

Typical Types of Fabricated Anchors:

THIN WALL LININGS (Approx. 1 inch or 25 mm thick)



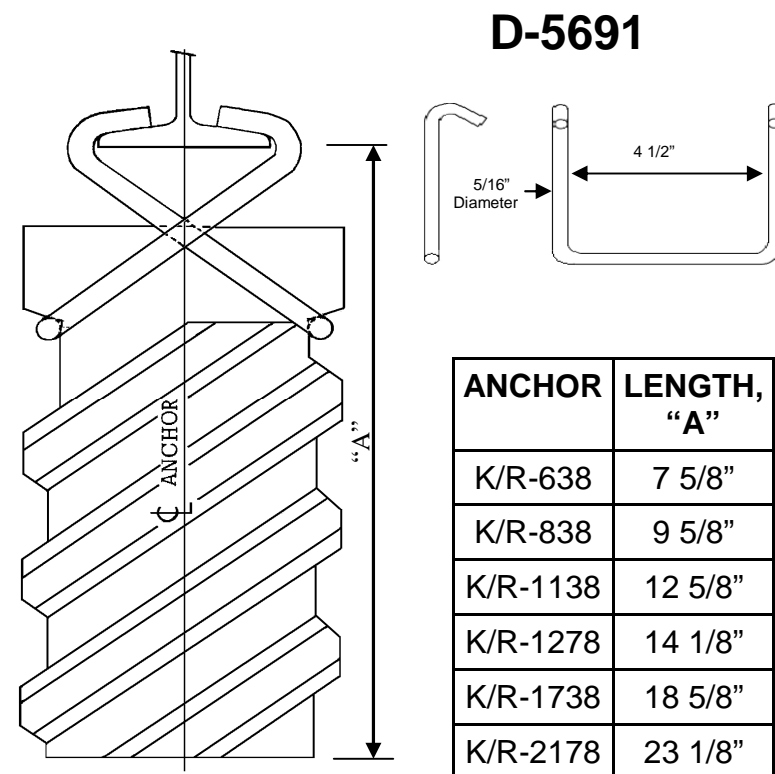
THICK WALL LININGS (Approx. 2 inch or 50 mm and Thicker)



Wire and Cast Metal Anchor Size

- Wire Anchor Thickness: <6" lining thickness use minimum 1/4" dia. anchors.
 >7" lining thickness use minimum 5/16" dia.anchors.
- Wire Anchor Length: <6" lining thickness, 1" from hot face.
 ≥6" lining thickness, 1" from hot face.

Fabricated, Wire and Cast Metal Anchor Spacing



CAST LININGS

	Lining Thickness	Anchor Centers
	Walls, Cylinders and Slopes	2"-3" 4"-5" 6"-13 1/2"
Roofs and Noses	2"-3"	4"
	4"-6"	8"
	7"-9"	10"
Floors *	2"-4"	9"
	5"-9"	12"
	>9"	18"

WET SHOTCRETE OR DRY GUNITE LININGS

	Lining Thickness	Anchor Centers
	Walls, Cylinders and Slopes	2"-3" 4"-5" 6"-13 1/2"
Roofs and Bullnoses	2"-3"	3"
	4"-6"	6"
	7"-9"	9"
Floors *	2"-4"	9"
	5"-9"	12"
	>9"	18"

For 2-component linings use the hot face lining thickness to determine the anchor spacing.
 Floors typically do not require anchors when the floor is sloped at 15° or less.

Maximum anchor spacing for Casting: 12" Sidewall, 10" Overhead
Maximum anchor spacing for Shotcrete and Dry Gunite: 12" Sidewall, 9" Overhead