

HIGH-STRENGTH WELDED WIRE REINFORCEMENT (WWR) COMPARED WITH REBAR

WWR Saves Money Over Rebar

Typically, A Savings in Placing Costs of Over 50% Can Be Realized on the Average Project When Welded Wire Reinforcing is Used Over Rebar

Placing costs for welded wire reinforcement in lighter styles, less than a W or D6, generally will be in the range of 5 to 8¢ per square foot. Placing costs for heavier WWR styles will be in the range of 9 to 15¢ per square foot. Compare those costs with rebar tying and placing costs and you will find welded wire will usually save you over 50% of your placing costs.

High-Strength WWR Will Save Up to 25% of the Weight of Reinforcing Materials While Maintaining the Same Strength As Conventional Reinforcing



"With welded wire you don't have to prepare it — it is already welded together — you pick it up and set it in place and continue the pour"
 - Dave Smith, Project Manager,
 Murphy & Sons, General Contractor

Here is an example of a recent project: A 6" (152 mm) slab on ground^{1,2} requiring an area of steel in a single layer to be 0.094 in.²/ft. (200 mm²/m) requires the following steel reinforcing:

- 1) #3 @ 14" [$f_y = 60,000$ psi (415 MPa)] Wt. = 64 lb./CSF (3.12 kg/m²)
- or
- 2) WWR 12 X 12 - D7.5 x D7.5 [$f_y = 75,000$ psi (520 MPa)] Wt. = 52 lb./CSF (2.54 kg/m²)
- or
- 3) WWR 16 x 16 - D10 x D10 [$f_y = 75,000$ psi (520 MPa)] Wt. = 52 lb./CSF (2.54 kg/m²)

Both welded wire solutions saves approximately 20% of the weight over rebar³ [up to 80,000 psi (550 MPa) yield strength WWR can save up to 25%]. In most cases the weight savings will result in an overall savings of material delivered over rebar⁴ since it is necessary to consider the cost of tying rebar in place or in mats. Further, the cost to handle the rebar is more labor intensive and that added cost must also be factored into the cost comparisons. Incidentally, support costs for WWR are the same costs used for rebar.

Overall, when you design and specify high strength welded wire reinforcement, the bottom line material in-place savings of up to 25% can be achieved over rebar. In many cases #3, #4 and #5 rebar will only be available in Grade 60 material.



“ You’re going to save a substantial amount in labor costs when you place welded wire. Compare that cost with having to prepare another product such as rebar . . . where you have to tie it and place it” — Dave Smith, Project Manager, Murphy & Sons, General Contractor.

Here Are Some Quotes from a General Contractor for Proof of Cost Savings with WWR

On a recent project,⁴ Dave Smith of Murphy & Sons, Southaven, MS said when asked—Why he used welded wire instead of rebar?:

“ With welded wire reinforcing, you’ve got less manhours. You can take a sheet of welded wire and move it – typically 1 person can move it – it’s easier with 2 for placement procedures. When you’re dealing with rebar mats, it takes a minimum of 8 people to move it – that’s 8 people you’ve got to take from another part of the job to do that.”

On another question asked of Dave Smith—Will you comment on the cost savings of reinforcing for your recent project?

“ As we all know from an owner’s standpoint and I represent the owner—costs are always a big factor. When it comes down to the quality with a different product (welded wire reinforcement) and it costs less – it doesn’t get any better than that. That’s what we all try to achieve. You’re going to save a substantial amount in your labor costs when you place welded wire. Compare that cost with having to prepare another product like rebar – where you have to tie it and place . . . where with welded wire you don’t have to prepare it. You pick it up and set it in place and continue the pour.”

ACI 318 Approves High Strength Welded Wire Reinforcement

The ACI 318 Building Code has for a long time recognized the two materials, welded wire and rebar, as equal. Both WWR and/or rebar are used almost exclusively in reinforced concrete supported structures and precast/prestressed components.

For many years, previous ACI Code cycles have allowed wire, welded wire and rebar yield strengths to 80,000 psi for flexural stresses⁵ Now, in addition the latest Code cycle, ACI 318-95 approves deformed welded wire to 80,000 psi (550 MPa) in shear as well as flexure^{6,7}

Some Other Facts About Concrete Reinforcement

The various concrete reinforcing steels, cold-worked wire for welded wire reinforcement and rebar are very similar in application. Many times welded wire is used in combination with rebar to help keep a project on schedule or to provide the required cross-sectional area of steel utilizing the most efficient and more readily available sizes of materials. It’s interesting to note that hot-rolled rod used as raw material for cold-worked wire and welded wire has very different metallurgical properties compared to rebar, but the physical properties are very similar. It is well known when steel is coldworked the strength is increased⁸ It is inherent with wire and welded wire that cold-working low-carbon rod significantly increases the yield strength. Using high-strength welded wire reinforcement, allows engineers to specify lighter reinforcing while having the same or greater strength as rebar for more efficient and cost-savings designs. Remember, #3, #4 and #5 rebars usually are only available in Grade 60.

References:

- 1) WRI TF-705, “Innovative Ways to Reinforce Slabs on Ground” Robert Anderson, 1996
- 2) *Designing Floor Slabs on Grade*, Boyd Ringo and Robert Anderson, 1992, 1996
- 3) *WRI Structural WWF Detailing Binder*, 10 Chapters, Section 2 has tables comparing areas and weights of rebar and WWR with various strengths
- 4) Video, “A Visit to a Distribution Center Construction Site, A Contractor’s Views”, 1995
- 5) WRI “Manual of Standard Practice”, WWF 500, 1992
- 6) Tests to Determine Performance of Deformed Welded Wire Fabric Stirrups, *ACI Structural Journal*, 91-S22, Griezic, Cook & Mitchell
- 7) Evaluation of Joint-Shear Provisions for Interior Beam-Column-Slab Connections using High-Strength Materials, *ACI Structural Journal*, 89-S10, Guimaraes, Kreger, Jirsa
- 8) Ductility of Wire Reinforcing - *Industry Evaluation of WWR Elongation and Reduction of Area*, 1992