# Disc Spring Stack Design Worksheet

A structured worksheet for series, parallel and mixed Belleville washer stacks where force, travel and installed height must be reviewed together.

Draft review version | English source copy

Use this form to prepare a cleaner RFQ package before engineering review.

## 1. Application Target

| | |
|---|---|
| **What problem should the stack control?** | **Preload loss, leakage risk, vibration, settlement, compact high load, overload protection** |
| **Target force range** | **Minimum force, normal working force, maximum acceptable force** |
| **Required movement** | **Working travel, settlement reserve, total deflection, maximum allowed compression** |
| **Space envelope** | **Maximum OD, guide diameter, free stack height, installed stack height, pocket depth** |

## 2. Stack Logic

| | | |
|---|---|---|
| **Single disc spring** | Base load and base travel. | Useful when a single washer meets both force and movement targets. |
| **Parallel stack** | Higher force at similar travel. | Check friction, alignment and load sharing between nested washers. |
| **Series stack** | More travel at lower equivalent stiffness. | Check guidance, buckling risk and total installed height. |
| **Mixed stack** | Tunes force and travel together. | Useful when both load and settlement reserve are constrained. |

## 3. Proposed Stack Details

| | |
|---|---|
| **Washer geometry** | **OD / ID / thickness / free height / cone height** |
| **Number in parallel** | **Nested washers per set** |
| **Number in series** | **Opposed sets or total series groups** |

| | |
|---|---|
| **Total stack count** | **Total number of washers in one assembly** |
| **Installed height** | **Free stack height and compressed working height** |

## 4. Operating Conditions

| | | |
|---|---|---|
| **Temperature** | | Changes modulus, stress relaxation and material selection. |
| **Cycle expectation** | | Fatigue review depends on stress range, deflection and surface quality. |
| **Guidance** | | Poor guidance can cause uneven loading, rubbing or stack instability. |
| **Lubrication / friction** | | Friction changes stack force and hysteresis, especially in parallel stacks. |
| **Support faces** | | Seat geometry affects contact stress, K4 assumptions and repeatability. |

## 5. Review Checklist

| | | |
|---|---|---|
| Force at working deflection reviewed | ■ Open / OK / revise | |
| Total travel and solid height reviewed | ■ Open / OK / revise | |
| Guidance and seat faces reviewed | ■ Open / OK / revise | |
| Material and temperature route reviewed | ■ Open / OK / revise | |
| Fatigue or static duty confirmed | ■ Open / OK / revise | |

**Engineering review note:** Stack calculations are sensitive to friction, guide clearance, support face geometry, K4 source, material modulus, temperature and fatigue life assumptions. Fatigue life, K4 geometry source, friction and support face conditions must be reviewed by qualified engineers before final approval against the real assembly and duty cycle.