



Plugs and anchors: Selection and assembly aids

5. Loading

Alongside the criteria treated in 1-4, the permitted load (F) per plug or anchor is influenced by:

- Plug/Anchor dimensioning, installation depth, distances
- Material/Property class of the plug/anchor and the building component into which the loads were inserted
- Building component thickness, load working point, load type (pull, diagonal pull, pressure, transverse force, bending)
- Safety factors, details in the approvals

For a) The basis used for the calculation is the size of the actually supporting threaded part (nominal size partially relate to the outer/sheath/drill diameters)
 For b) The basis used for the values in approvals/from manufacturers apply to the corresponding form of delivery – e.g. steel, 8.8 or stainless steel A2/A4

6. Corrosion protection

The following guideline applies when specifying the proper protection of fixings against various types of corrosion:

The "Plug/Anchor fixing corrosion system" needs to be at least as fixed, durable and corrosion-resistant in the conditions of use as the parts to be fitted

The task of constructive planning is to determine the necessary corrosion protection measures:

Here the wear-and-tear contingency of the corrosion protection in known operating conditions is to be taken into account until maintenance is due or until the limitation of damages has been reached. Surface or material specifications are to be set accordingly in the article order text.

Table 3: Overview of the surface and material corrosion protection options

Delivery condition/ Corrosion protection	Extent of load/ Protective effect	Area of use	Notes
Zinc plated steel Coating thickness ~ 5–8 mm	I – II = mild – moderate	closed, dry interior rooms	
Hot dip galvanized steel (tZn) Coating thickness ≥ 40 mm	≥ IV = very strong	outdoor area e.g. pole/ crash barrier fixing	only with thicker dimensions due to the necessary play of the thread not a component of the tech. approval
Plastic (Nylon)	> IV = very durable	all atmospheric conditions	only special models on offer
Stainless steel A 4 (Material 1.4401/ 1.4571)	> IV = very durable	general atmospheric conditions rear-ventilated facades/roofs seawater/sea air	not for atmospheres containing chlorine (danger of pitting/stress corrosion)
Stainless steel Material 1.4529	> IV = very durable	specifically, indoor swimming pools, tunnels, parking garages, seawater areas	specifically for areas with high chlorine/chloride exposure

7. The clamp length – the installation length

The entire length of ready-to-install complete plugs/anchors for push-through installations is subdivided into:

– **Clamp length** ("use length", "grip strength", "grip thickness") $d_a / t_{fix} / d_p + t_{fix}$

These need to be chosen as at least as large as the entire thickness of the assembly components to be fastened + non-structural construction material layers (plaster)

– for stand-off fixing + distance

– **Installation length / Anchoring length** h_{ef}

This needs to be integrated as a minimum anchoring depth in the fully load-bearing building material section. Load values only apply with the correct installation depth. See assembly instructions.

8. The assembly

Plugs and anchors can only achieve their intended task when they are properly installed.

The planner is to instruct the following for installation:

- Type, execution and dimension of the plug/anchor
- Edge and axial spacing on the component
- Special specifications of the technical approval

The grip/use lengths and the installation lengths/depths for the corresponding plugs and anchors are available from Maryland Metrics.

The following needs to be taken into consideration for correct assembly:

- The specifications of the planner according to sections 1 – 7
- Drills and drill techniques (→ 8.1 Table 4)
- Drillhole Ø/depth (→ Assembly instructions of the manufacturer)
- Borehole cleaning (→ 8.2)
- Assembly type (→ 8.3)
- Minimum anchoring depth/clamp length (→ 7)

