Symmetrical Quick Couplers for Excavators

Standardization by Maskinleverantörerna

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1. Introduction

The Symmetrical Quick Coupler standard (the S-Standard) for excavators is an industry standard owned and managed by the independent Swedish Machine Suppliers organization - Maskinleverantörerna. The S-Standard is designed to create a competitive Quick Coupler for machine owners, excavator manufacturers, distributors and work tool manufacturers.

The key benefits for excavator owners with the S-Standard is a low building height, wide body design, relatively low weight and especially, a maintenance-free coupler compared with many quick couplers available on the international market. The S-Standard is a wedge type coupler that together with the dedicated Brackets assures the highest safety standards for both machine drivers and support staff.

2. Bakgrund

Quick Couplers for excavators were first developed in Sweden in the early 1970s. During the 80s and 90s a variety of Quick Couplers were used in the Nordic markets. Prior to the S-Standard, the lack of clear guidelines, standard dimensions and tolerances, often resulted in a poor compatibility between products from different manufacturers. This often caused problems and costs for machine distributors, excavator owners and the work tool producers themselves.

Symmetrical Quick Couplers already existed in the market for backhoe loaders and for mid-sized excavators which were used as a reference when the S-Standard was first established in the year 2000. The S-Standard was updated in 2006 and has been revised and further clarified in 2010 and 2011.

3. Purpose

The purpose with the S-Standards is to:

1. The purpose with the S-Standards is to:
2. Create a standard that is safe, user-friendly and harmonizes with international standards such as EN474 and the coming ISO13031.
3. Create a competitive and open industry standard that is not controlled by a single producer but instead controlled by of a recognized and independent industry association.
4. Create a uniform nomenclature for naming of Quick Couplers of different sizes within the standard
5. Create a uniform manufacturing standard for dimensions and tolerances adapted for an efficient production process.
6. Create a design that makes it cost efficient to retrofit Brackets to used and new buckets and work tools.
7. Create a design which is suitable for mounting in tiltrotator applications.
8. Create a standard which maintains the excavators breakout force as much as possible.
9. Have a Quick Coupler width that harmonizes with most dipper arm dimensions for relevant size intervals.
10. Eliminate play and the need for manual shimming.
11. Create a design that allows for future installation of fully automated systems for hydraulic couplings and electrical cables
12. Have a design that can be supported by a majority of Swedish and Nordic work tool manufacturers.

4. Denominations within the S-standard

In total there are thirteen sizes of Quick Couplers in the S-Standard denominated on the basis of the shaft diameter, S30, S40, S45, S50, etc. up to and including S120.

Each Quick Coupler manufacturer may add their company denotation before the Quick Coupler name given that the Quick Coupler is manufactured to support the relevant torque specified in the Load Table below and that tolerances are within specified limits according to Dimensions and Tolerance Table below

5. Torque

In the S-Standard requirements are specified for which positive and negative torque each Quick Coupler size must be able to withstand from a strength perspective.

Positive torque is defined as the torque around the front axis when used in the digging direction. Negative torque is defined as the torque in the bucket opening direction.

See Figure 1.

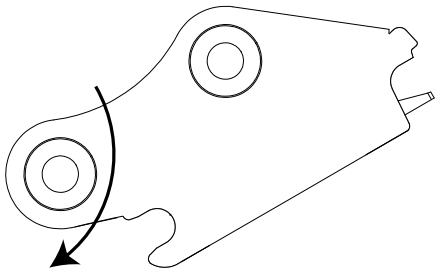


Fig 1. Positive torque direction

6. Tolerances

Manufacturing tolerances are natural in all production activities, so also for Brackets and Quick Couplers within the S-Standard. Tolerances acceptable within the standard can be found in the Dimensions and Tolerance Table below.

To ensure maximum life time of work tools and Quick Couplers it is of outmost importance that manufacturing tolerances are assimilated in the right positions in the Quick Coupler.

Within the S-Standard strives for maximum surface area in the front shaft where most of the digging forces are assimilated with a positive torque as defined above.

Manufacturing tolerances shall in the Quick Coupler be assimilated in the rear grip. The rear grip shall be of such design so that the wedge in its locked position assimilates any manufacturing tolerance.

See Figure 2.

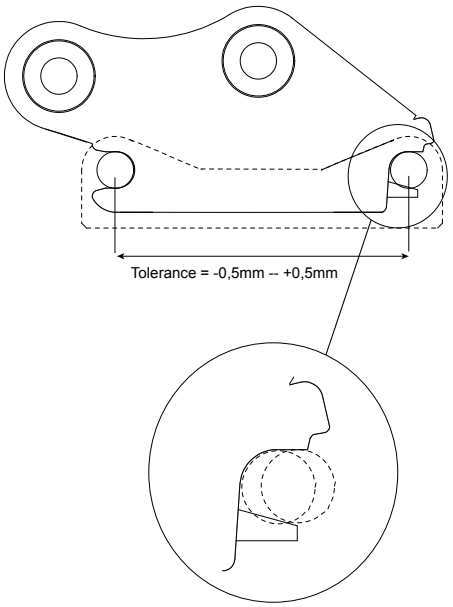
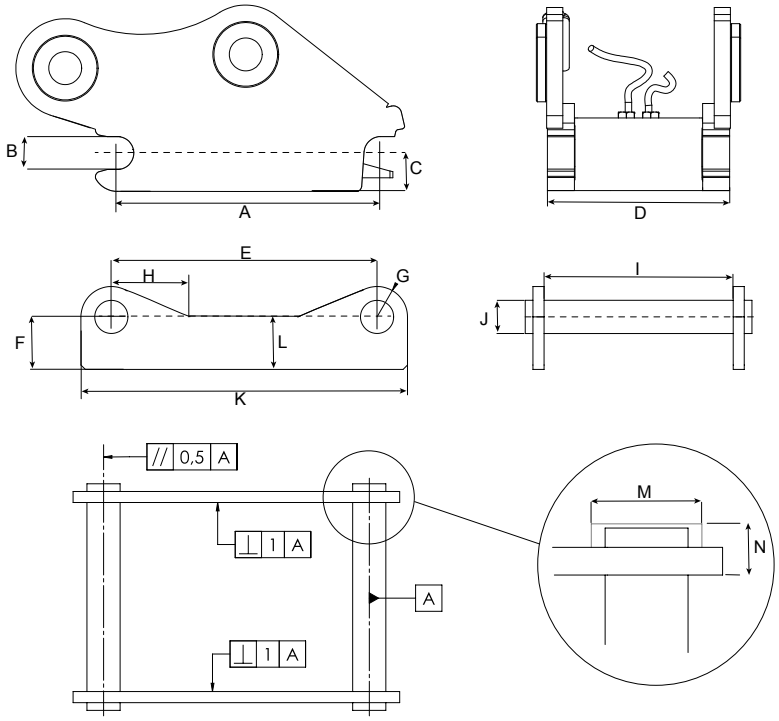


Fig 2. Tolerances assimilated in the rear grip

7. Dimensions and tolerance table



Measure-ments (mm)	S30 /150	S30 /180	S40	S40 /240	S45	S50	S60	S70	S80	S90 /620	S90 /750	S100	S120
A -Tolerance	199,8 ±0,2	229,8 ± 0,2	299,8 ± 0,2	299,8 ± 0,2	429,8 ± 0,2	429,8 ± 0,2	479,8 ± 0,2	599,8 ± 0,2	669,8 ± 0,2	749,8 ± 0,2	749,8 ± 0,2	899,8 ± 0,2	924,8 ± 0,2
B -Tolerance	30 H9	30 H9	40 H9	40 H9	45 H9	50 H9	60 H9	70 H9	80 H9	90 H9	90 H9	100 H9	120 H9
C	Max 40	Max 45	Max 50	Max 50	Max 65	Max 65	Max 80	Max 100	Max 115	Max 125	Max 125	Max 150	Max 200
D -Tolerance	148 ± 1	178 ± 1	198 ± 1	238 ± 1	288 ± 1	268 ± 1	338 ± 1	448 ± 1	588 ± 1	618 ± 1	748 ± 1	748 ± 1	868 ± 1
E -Tolerance	200,5 ± 0,5	230,5 ± 0,5	300,5 ± 0,5	300,5 ± 0,5	430,5 ± 0,5	430,5 ± 0,5	480,5 ± 0,5	600,5 ± 0,5	670,5 ± 0,5	750,5 ± 0,5	750,5 ± 0,5	900,5 ± 0,5	925,5 ± 0,5
F	Min 45	Min 50	Min 55	Min 55	Min 70	Min 70	Min 85	Min 115	Min 135	Min 155	Min 155	Min 175	Min 240
G	Max 30	Max 30	Max 40	Max 40	Max 45	Max 45	Max 60	Max 75	Max 90	Max 110	Max 110	Max 125	Max 145
H	Max 85	Max 85	Max 100	Max 100	Max 125	Max 125	Max 150	Max 250	Max 250	Max 250	Max 250	Max 250	Max 250
I -Tolerance	152 ± 1	182 ± 1	202 ± 1	242 ± 1	292 ± 1	272 ± 1	342 ± 1	452 ± 1	592 ± 1	622 ± 1	752 ± 1	752 ± 1	872 ± 1
J -Tolerance	30 f8	30 f8	40 f8	40 f8	45 f8	50 f8	60 f8	70 f8	80 f8	90 f8	90 f8	100 f8	120 f8
K	Max 260	Max 290	Max 380	Max 380	Max 520	Max 520	Max 600	Max 740	Max 830	Max 1000	Max 1000	Max 1150	Max 1250
L	Max 45	Max 50	Max 55	Max 55	Max 70	Max 70	Max 85	Max 115	Max 135	Max 200	Max 200	Max 250	Max 300
M	Max 62	Max 62	Max 72	Max 72	Max 77	Max 77	Max 92	Max 102	Max 122	Max 132	Max 132	Max 142	Max 162
N	Max 25	Max 25	Max 28	Max 28	Max 30	Max 30	Max 35	Max 40	Max 55	Max 70	Max 70	Max 75	Max 80

8. Load table

Quick Coupler Size	Width (mm)	Shaft c-c (mm)	Shaft diameter (mm)	Minimum Positive Torque (kNm)	Minimum Negative Torque (kNm)	Max recommended machine weight (ton)
S30/150	150	200	30	28	20	2
S30/180	180	230	30	28	20	2
S40	200	300	40	35	23	6
S40/240	240	300	40	40	26	7
S45	290	430	45	65	42	11
S50	270	430	50	65	42	11
S60	340	480	60	150	75	18
S70	450	600	70	300	195	30
S80	590	670	80	600	390	40
S90/620	620	750	90	1000	650	70
S90/750	750	750	90	1000	650	70
S100	750	900	100	1200	775	85
S120	925	870	120	1600	1000	100

Revision History

Date	Description	Done by (initials)
March 15, 2006	Quick Couplers S30/150, S30/180, S90 och S120 added. Load table added.	
May 28, 2010	Quick Coupler S100 added. Clarification regarding torque definition and tolerances added. Width S120 adjusted to 870 mm. Reverences to old couplers B20/B27 and S1/S2 deleted and separated into a document of its own.	LP, SS
June 13, 2011	Definition of max width for sideplates (measures M+N) added. S90/620 added and former S90/750 defined.	SS, MA

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