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D003771X – 03/2012 – © Melters Werbeagentur GmbH

COMBINATION TEST OF
ROUNDSLINGS WITH SHACKLES

Height Safety
Lifting
Load Control
Safety Management

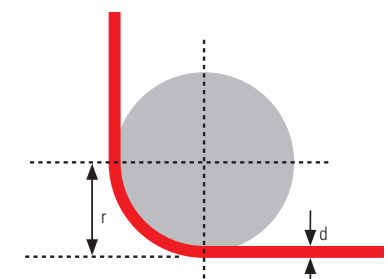




Checking the system strength

Background

Round slings are frequently used in combination with shackles of the same nominal carrying capacity in everyday lifting applications. But in many cases the turning radius of the shackle is a sharp edge for the sling as defined by the accident prevention and insurance associations' rule of thumb (turning radius has to be greater than the thickness of the lifting gear).



Definition of a sharp edge:

radius edge < thickness of lifting gear

There are neither any rules nor results from practical tests in this sector. SpanSet GmbH & Co. KG and Axion GKS Stahl- und Maschinenbau GmbH have tested the strength of certain combinations of round slings and shackles together with the DGUV, Deutsche Gesetzliche Unfallversicherung – Fachausschuss Metall und Oberflächenbehandlung (German Social Accident Insurance – Metal and Surface Treatment Technical Committee), Hanover in the 600 t test rig at Axion. The shackles from the Exoset series proved to be ideal for use with round slings thanks to their special coating and burr removal in the contact area.



The 600 t test rig at Axzion



Typical impression marks after stressing with four times the nominal carrying capacity with a woven round sling sleeve



Much less damage to the protective sleeve of the Magnum-X round sling sleeve after stressing with four times the nominal carrying capacity thanks to an innovative sleeve construction

Checking the system strength

Selecting the equipment under test

The spectrum of tested lifting capacities for the combinations of round slings and shackles covered the most common increments from 0.5 t up to 150 t. We tested round slings made of both classic polyester fibres as well as round slings of high-performance fibres, such as those used in the SpanSet Magnum-X series. The latter is of particular interest since the properties of the fibre material used in these slings differs from those of conventional polyester fibres.

Standard shackles from the Exoset series were used in the tests. These shackles have a uniform high quality, a special coating and are deburred, making them very different from standard imported shackles and ideal for use together with round slings. We deliberately avoided the use of special sling shackles in line with common practice.

Test procedure

A test plan was drawn up in cooperation with the DGVU that took into account the usual combination of parts with the same WLL. 5-times the nominal carrying capacity was defined as the target strength to be achieved for round slings with a nominal lifting capacity of below 8 t and 4 times the nominal carrying capacity for slings with a nominal lifting capacity of 8 t or more. The slings were positioned in the bow of the shackles in each case.

The strength tests were then carried out on the calibrated tensile testing machines available at SpanSet and Axzion. The test was deemed to have been passed successfully as long as there was no sudden drop in force or a complete breakage of the sling. Damage to the sling's sleeve or deformations of the shackle were acceptable in view of the excess load.

Result

All of the various combinations that were tested achieved the respective target strength. High-performance fibres of an older fibre generation (e.g. aramides) such as were originally used in round slings displayed the disadvantage that they reacted quite sensitively to such stresses. This was not observed with the high-performance polyesters used in the Magnum-X slings. Details of the components used can be found in the tables on the next page.

Further information can be found on the Internet at: www.magnum-x.de

A demonstrative film on the shackle test can also be found on the Internet at: www.spanset.de/download/bilder-filme.html

Our partners:



Zertifizierung ab 40t plus

Type of roundsling	Fabric	WLL roundsling [kg]	Material width roundsling [mm]	Material thickness roundsling [mm]	Proof loading [kN]	Exoset shackle	WLL shackle [kg]	ø Material thickness Exoset-shackle [mm]	Width of Exoset-Shackle [mm]
SupraPlus	Polyester fibre	500	36	5	25	D041552	500	7,0	20
SupraPlus	Polyester fibre	1.000	36	6	49	D041552	1.000	10,0	26
SupraPlus	Polyester fibre	2.000	37	8	99	D041552	2.000	13,5	32
SupraPlus	Polyester fibre	3.000	44	10	148	D041553	3.250	16,0	43
SupraPlus	Polyester fibre	4.000	52	12	197	D041554	4.750	19,0	51
SupraPlus	Polyester fibre	5.000	59	13	246	D041555	6.500	22,0	58
SupraPlus	Polyester fibre	6.000	65	14	295	D041555	6.500	22,0	58
SupraPlus	Polyester fibre	8.000	68	17	314	D041556	8.500	25,0	68
MagnumPlus	Polyester fibre	10.000	90	19	393	D041557	12.000	32,0	83
MagnumPlus	Polyester fibre	15.000	115	21	589	D041559	17.000	38,0	99
MagnumPlus	Polyester fibre	20.000	135	23	785	D041560	25.000	45,0	126
MagnumPlus	Polyester fibre	30.000	170	27	1.178	D041561	35.000	50,0	138
MagnumPlus	Polyester fibre	40.000	190	37	1.570	D041562	42.500	57,0	160
MagnumPlus	Polyester fibre	60.000	190	75	2.355	D041563	85.000	75,0	190
MagnumPlus	Polyester fibre	80.000	230	86	3.140	D041563	85.000	75,0	190
MagnumPlus	Polyester fibre	100.000	260	96	3.924	D043903	120.000	95,0	238
Magnum-X	High performance fibre	10.000	55	12	393	D041557	12.000	32,0	83
Magnum-X	High performance fibre	20.000	80	15	785	D041560	25.000	45,0	126
Magnum-X	High performance fibre	30.000	90	20	1.178	D041561	35.000	50,0	138
Magnum-X	High performance fibre	40.000	110	24	1.570	D041562	42.500	57,0	160
Magnum-X	High performance fibre	50.000	117	23	1.962	D041562	55.000	65,0	180
Magnum-X	High performance fibre	60.000	150	30	2.355	D041563	85.000	75,0	190
Magnum-X	High performance fibre	80.000	200	40	3.140	D041563	85.000	75,0	190
Magnum-X	High performance fibre	100.000	233	47	3.924	D043903	120.000	95,0	238
Magnum-X	High performance fibre	125.000	267	53	4.905	D043904	150.000	105,0	275
Magnum-X	High performance fibre	150.000	308	62	5.886	D043904	150.000	105,0	275